# Machine Shop

(Innouncing Moore-Fosdick Jig Grinder

THE ONLY AUTOMATIC POSITIONING JIG GRINDER IN THE WORLD!

See pages 36 and 37.



#### This one looked great...on paper

JOR all its nine wings and eight engines, the 25-ton "Epocha," built over 30 years ago by the Caproni Brothers, never got off the water. It might have - but it was destroyed by fire before the first test flight. Success or failure? The world will never know. Yet multiple wing types, favored by many early designers, are just memories now - left far behind in the competitive struggle for existence.

Competition is a mighty strong force today. Because of it, manufacturers everywhere are seeking new ways of improving product quality and cutting manufacturing cost. That's where we come in. For precision finishing on Heald machines can often make substantial savings in production time - help build a better, longer-lasting product, too.

Your Heald precision finishing specialist will be

glad to show you how the latest developments in automation, way-type and transfer Bore-Matics, new grinding methods and interchangeable tooling can be applied to advantage on your production line.

Competition is wonderful if you're ahead of it. Our business is to help keep you there. That's why IT PAYS TO COME TO HEALD.







Grinding Machines

THE HEALD MACHINE COMPANY

WORCESTER 6. MASSACHUSETTS

Offices in Chicago . Cleveland . Dayton Detroit . Indianapolis . New York

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Robert I. Shore

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R. L. Griesinger

contributing editor Gilbert C. Close Machine Shop

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Gardner Publications, Inc. 431 Main St., Cincinnati 2, Ohio

## 3/8" Machine threads 500 pieces per hour...

... with 4,500 pieces threaded between chaser grinds—25% more production and 80% longer tool life than by best previous methods. #10 24-P UN threads are cut 1¾" long on 54" galvanized wire rods at Mid-West Wire Products, Detroit, Mich. For more information on this small high-speed machine for threading 316" to 1/2" in diameter, ask for bulletin H-91.



#### LANDIS Machine COMPANY

398 WAYNESBORO . PENNSYLVANIA . U.S.A.



### OF KALAMAZOO 6" CARBIDE GRINDER

### Exclusive Features

BRAKE on each end for handy, quick stopping when reversing.

NO SPRAY-NO SPLASH SWIVEL GUARD closes one side of wheel while other is in use. It is the heart of Hammond's patented No Spray - No Splash feature.

NO SPRAY - NO SPLASH SPOUT aerates and breaks up coolant which flows without

NO SPRAY - NO SPLASH PAN catches any excess spray or splash and keeps operator and floor dry.

SAFETY CUP DISC fills the cup of a silicon carbide wheel, preventing tool or hand from entering. An important safety feature - patented.

TABLE SCREW FEED makes table adjustment easy and protects against wheel damage.

TABLE easily tilts to any degree from 30° above to 30° below horizontal and quickly locks with a single lever. Table is surface ground and has a cored selfcleaning slot.

TWO MODELS AVAILABLE — WD-6 Wet or Dry as shown, and D-6 Dry (bench or floor). Is of the same general construction as the Model WD-6 except for the wet equipment.

There are more new and exclusive features on the Hammond Model WD-6 than on any other low-cost wet 6" carbide grinder. It is a full-fledged machine which incorporates the many features of the larger Hammond 10" and 14" Grinders. Compare and you'll find no equal in the low-cost 6" field.

Write for catalog showing America's most complete line of carbide tool grinders and finishers.

"FINEST IN THE LOW PRICE FIELD"

Hammond Machinery Builders

1615 DOUGLAS AVENUE

KALAMAZOD

KALAMAZOO, MICHIGAN

#### New · Fast · Proven

# methods for PERFORATING and NOTCHING SHEET METALS

#### Whistler MAGNETIC Dies

at work in large inclinable press. Magnetized retainers hold the units. No bolting required. A fast, economical method in making up a punch and die set for short or long runs. All parts re-usable.

#### Whistler ADJUSTABLE Dies

on perforating and notching job, using Tee slotted die set. With Whistler Adjustable Punch and Die units production starts within hours instead of weeks. Last minute job changes made quickly.

#### REDUCE DIE COSTS

All units and parts are interchangeable and used repeatedly in different arrangements. INCREASE PRESS PRODUCTION—Down time is minutes as compared to hours for changeover. For precision work in all types and sizes of presses. START PRODUCTION AT ONCE. Pierce materials up to ¼" thick mild steel. Standard sizes and shapes available up to 3 inches. Special sizes to order.







Here are the complete details with prices and application illustrations. Send for these catalogs. No obligation.

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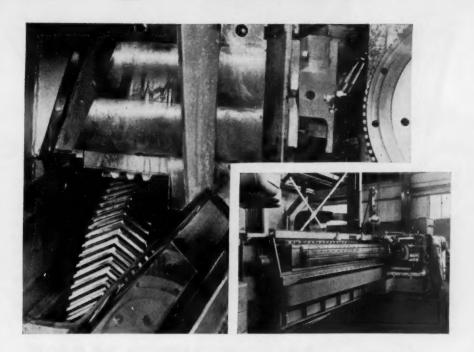
ZONE STATE

S. B. WHISTLER & SONS, Inc.

Adjustable, Magnetic, Custom and Cam Dies for all Industry

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DEMONSTRATIONS DAILY-BOOTH 135-METAL SHOW-NOV. 1 TO 5



### 300 FPM LAPOINTE BROACHING MACHINE HAS FARREL® HERRINGBONE RACK DRIVE

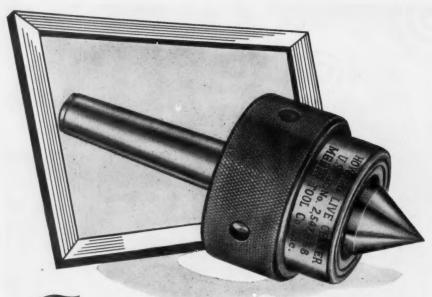
The Lapointe horizontal and vertical broaching machines, with electro-mechanical drive, are outstanding developments in broaching. The horizontal machine shown here is capable of broaching many jobs heretofore impossible, at speeds up to 300 FPM and more.

Farrel continuous tooth herringbone rack and gears drive the main slide. The quiet, vibration-free performance of this drive, which results from extreme accuracy of tooth spacing, contour and helix angle, is an important factor in attaining broaching smoothness at these high speeds.

Farrel herringbone gears are made of the finest grade materials, in any size from 1/4 inch to 20 feet in diameter. Send for further information.

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Sales Offices: Ansonia, Buffalo, New York, Boston, Akron, Detroit, Chicago, Memphis,
Minneapolis, Portland (Oregon), Los Angeles, Salt Lake City, Tulsa, Houston,
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FB-908



### Finest LIVE CENTER MADE

#### ... HERE'S WHY

- \* BACK UP RING assures positive rigidity.
- ★ Bar Expansion Eliminated by means of Thrust Spring.
- \*\* Special alloy tool steel spindles, hardened and ground.
- ★ Matched precision ball bearings, mounted in tandem.
- ★ Oil impregnated bronze tail bearing.
- ★ Points pre-loaded and ground after assembly.

★ A distinctive oil seal in front of bearings protects them from all foreign matter. Chips, dirt and cutting oil cannot reach the bearings.

The HOWARD Live Center is the ONLY center that offers the patented BACK UP RING. The Ring maintains solid contact between the quill and head of the center . . . thus greatly increases over-all rigidity.

Send for the new MELIN TOOL Catalog No. 54-C... it lists, in addition to specifications and prices on the HOWARD Live Center, the complete MELIN TOOL End Mill Line.



MELIN TOOL COMPANY, INC.

3373 West 140th St. Cleveland 11, Ohio



do you have
OIL SEAL TROUBLES?

Superfinished



### SUPERFINISH can solve them!

Here's a typical case where a shaft with ground surfaces was driven at a speed of 1750 r.p.m. The oil seals created enough heat to burn the shaft and stop the motor. To make matters worse, it was found that twice the original speed was necessary. So, the oil seal surfaces were Superfinished, and the shaft operated at a speed of 3500 r.p.m. With the Superfinished surfaces, no heat was developed at this higher speed. No further trouble was encountered.

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Write now for the booklet "Wear and Surface Finish."

#### THE GISHOLT ROUND TABLE

represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.





G SMACHINE COMPANY

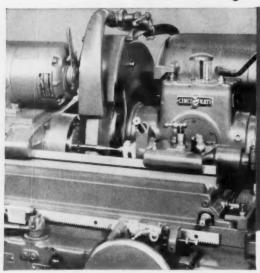
Superfinished

Madison 10, Wisconsin

TURRET LATHES . AUTOMATIC LATHES . SUPERFINISHERS . BALANCERS . SPECIAL MACHINES

### Producing Low Cost Precision is a job for today's

### CINCINNATI FILMATIC PLAIN HYDRAULIC GRINDERS



Wide range of CINCINNATI FILMATIC Plain Hydraulic Grinders.

Infeed grinding the bearing diameter of a cotton picker spindle, CINCINNATI FILMATIC 6" Plain Hydraulic Grinder,

CINCIN



Grinding the sleeve diameter of a gear assembly. CINCINNATI FILMATIC 10" Plain Hydraulic Grinder.



#### CINCINNATI FILMATIC

Plain Hydraulic Grinders

According to a recent survey, you could replace many of your old centertype grinders now with new machines, and immediately gain two big advantages:

1) Higher production at a lower cost

2) Closer accuracy

Here's the way in which CINCIN-NATI FILMATIC Plain Hydraulics, the 10" size for example, help you attain these desirable results: FILMATIC grinding wheel spindle bearings are an outstanding factor in producing low-cost precision, they never require adjustment or maintenance; two-speed manual table traverse aids the

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CINCINNATI GRINDERS INCORPORATED

Subsidiary of The Cincinnati Milling Machine Co.

CINCINNATI 9, OHIO



CENTERTYPE GRINDING MACHINES • CENTERLESS
GRINDING MACHINES • CENTERLESS **MACHINES • MICRO-CENTRIC GRINDING MACHINES** 

### A Jig Borer And Miller For Jobs Up To 30"X 48"!



- Fulfills every requirement for accurate boring, drilling and vertical milling of large workpieces up to 5000 Lbs.
- Simplified setup, operation and inspection are possible because many parts are easier clamped on a table than mounted on a horizontal machine.
- All controls are in a single movable panel. Operator can control table and spindle from most convenient location vithout ever changing his position.
- Infinitely variable spindle speeds and feeds. Non-gear, easily maintained direct drives provide unusual smoothness of operation.
- 35" throat capacity—safety controls for machine, job and operator—unusually heavy construction—and a dozen other exclusive features.

Ask For Brochure

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W. B. KNIGHT MACHINERY CO. . 3922 WEST PINE BLVD. . ST. LOUIS 8, MO.

### NEW! Norton Cast ALUNDUM\* **Tumbling Abrasive**

Cuts faster and lasts longer...saves you time and trouble...adds the profit-boosting "TOUCH of GOLD"



Cast ALUNDUM tumbling abrasive, newest Norton electric furnace product, offers these advantages to help you cut the time and costs of finishing many of your parts.

- Extreme Sharpness, which increases cutting speed, reduces tumbling time and expense.
- · Great Density, which means slower breakdown, longer service life and more work done.
- Extra Hardness, which means no fracturing. This eliminates the costly, timeconsuming chore of cleaning out chips or slivers that have lodged in the parts being tumbled.

As a result, cast ALUNDUM abrasive produces about 10% faster cutting speed and 40% slower breakdown than older types of tumbling abrasive. Why not add these profit-increasing "Touch of Gold" benefits to your own finishing operations?

See Your Norton Distributor for further facts on cast ALUNDUM tumbling abrasive, now ready for prompt delivery in sizes OOT (1½-2"), OT (1-1½") and IT (¾-1"). Or write to Norton Company, Worcester 6, Mass. Distributors in all principal cities. Export: Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

Claking better products . . , to make other products better

\*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

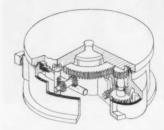


and Its BEHR-MANNING division

NORTON: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes



### new



#### HYDRAULIC INDEX TABLE WITH BUILT-IN SAFETY FEATURES

#### SIMPLE DESIGN

Merely a worm and a worm gear. Notice the cut-away drawing.

#### COMPLETELY HYDRAULIC OPERATED

The Index Table is driven by a fluid drive motor to provide smooth operation.

#### PROVIDES YOU MAXIMUM SAFETY

Electrical failures in any unit—engaging fixtures with drill head, while the table is in operation—stops the table automatically.



Now available in four sizes—20", 30", 42" and 60" Can be bored for any number of stations (2 to 15)

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engineers and manufacturers of production machines and drilling equipment



You can't keep production up when socket screw problems are getting you down. Even such a small thing ... one screw that doesn't start quickly or drive home correctly ... perhaps a shipment that doesn't arrive on time ... can hamper a fast-moving production line.

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We'll submit descriptive literature or samples for your most critical examination. No obligation, of course; just specify types and sizes.

#### THE BRIGHTON SCREW & MANUFACTURING CO.

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### can do your tapping jobs better!

A complete range of Jarvis Torqomatics and Multi-Tapping and Drilling Heads available to fit any type drill press or tapping machine.

You'll like their trouble-free performance — their ability to produce quality threads — their increase in tapped holes per hour, the savings in taps—and their ease of operation!

We invite your inquiries about these highly efficient Jarvis machines that have outmoded all other slow, expensive and highly perishable machines of the past.

Jarvis Torqomatics are priced low enough to make it economically possible to replace your old tapping devices and attachments.



A Jarvis representative will be glad to consult with you - so obligation.

Sand for Complete Catalog



THE CHARLES L. JARVIS CO.



#### have "Custom Made" Cutting Edges at NO EXTRA CHARGE

"Custom Made" means just that! Accurate indexing and precision machine grinding of flute and spiral points on Jarvis Taps produce a tool in which ALL the cutting edges do their share of the work. Our highly accurate fluting process makes it possible for us to control for your PARTICULAR NEEDS the amount of hook ground in the flutes. Specify Jarvis, and you'll always have "Custom Made" Taps designed to do a specific job superbly well.



Send for complete New 56 page Tap Catalog and Manual.



ACCURATE SQUARES

CONCENTRIC SHANKS

> UNIFORM FLUTE SPACING

CONTROLLED ноок

PRECISION GROUND CHAMFER







TORQUMATICS









THE CHARLES L. JARVIS COMPANY, MIDDLETOWN IN CONNECTICUT

"LeBlond Lathes help us



Turning Tough Titanium— A LeBlond 16"/38" Sliding Bed Gap Lathe with Hydra-Trace, performing the difficult job of contour facing a titanium forging, Columbia, Machine Products likes the LeBlond for its smooth power, rigidity and versatility.

## turn tough Titanium successfully"

... says Columbia Machine Products, Brooklyn, N.Y.

Turning titanium is tough. Columbia builds its success on licking problems like this, and dependable equipment plays a vital role. To Columbia that means LeBlond Lathes—for the smooth power, rigidity and versatility they need.

For example, take the job shown on the left. A jet engine rotor compressor disc is being machined from a titanium forging. This contour job is faced on a LeBlond 16°/38° Sliding Bed Gap Lathe equipped with LeBlond Hydra-Trace\*. Operating specifications must remain Columbia's trade secret. We can say, however, that they must hold tolerances as close as .0005° and finish to 32 microinches.

Columbia explains, "Since these titanium forgings are extremely costly, yet have no chip or scrap

value, we must have dependable accuracy and finish without spoilage. Speed is important, too, because of the substantial amount of material that must be removed. LeBlond Lathes have what it takes to do jobs like this successfully, at competitive prices. One word sums up our feelings about LeBlonds—Excellent!"

Whether you're turning tough titanium or more conventional materials, one of LeBlond's 76 lathe models will fill the bill—exactly! LeBlond offers a complete line of lathes from the 13° Regal to the 50° Heavy Duty. Also available are Sliding and Plain Bed Gap lathes; Hollow Spindle lathes; Dual Drive lathes; Tool Room and Rapid Production lathes. For the right lathe for your job, call your nearby LeBlond Distributor, or write us.

Ask for Catalog 54-E for a description of LeBlond's complete line.

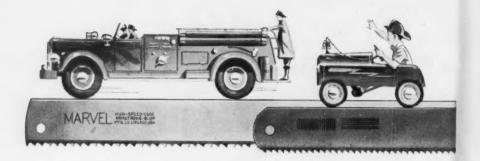
\*Hydra-Trace (Trade Mark, Registered U. S. Pat. Office) is LeBlond's heavy-duty hydraulic tracing attachment. Can be mounted in place of the compound rest on practically all LeBlond Lathes.

turned faster by



THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO

WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES . FOR MORE THAN 66 YEARS.



#### ... but

#### Experience Cannot be Copied

More than a quarter-century ago MARVEL invented and basically patented the MARVEL High-Speed-Edge Hack Saw Blade—the UNBREAKABLE blade that increased hack sawing efficiency many-fold.

Every MARVEL Hack Saw Blade ever sold has been of that basic welded high-speed-edge construction, with constant improvements from year to year, as EXPERIENCE augmented the "know-how"...

MARVEL is not "tied" to any single source of steel supply, and has always used the best high speed steels that became available from time to time as metallurgy progressed. Whenas-and-if finer steels are developed—and are proven commercially practical for welded-edge hack saw blades—MARVEL will use them, regardless of cost or source . . .

There is only one genuine MARVEL High-Speed-Edge! All other "composite" or "welded-edge" hack saw blades are merely flattering attempts to imitate—without the "know-how" of MARVEL EXPERIENCE . . .

Insist upon genuine MARVEL High-Speed-Edge when buying hack saw blades—and be SAFE, for you can depend upon MARVEL. They have been "tested", "pre-tested", and "re-tested" by thousands of users for more than a quarter-century!



ARMSTRONG-BLUM MFG. CO. . 5700 Bloomingdale Ave. . Chicago 39, U. S. A.

### Norgren Spray-Lube

System

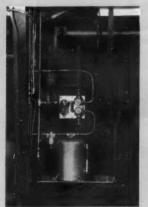
#### DOUBLES OUTPUT OF VERTICAL TURRET LATHE at O. K. RUBBER, INC.



4 Spray-Lube lines give full spray coverage over 144" cutting edge of tool.

On roughing and finishing a straight ribbon tread on cast aluminum tire capping mold, Norgren Spray-Lube:

- \* stepped up surface cutting speed from 45 to 75 rpm.
- · increased depth of cut.
- · eliminated welding of chips on cutting tool.
- · ended galling of work pieces.
- \* reduced tool maintenance.
- · improved quality of work.



Spray-Lube control panel and liquid reservoir are centrally located for several machines.

#### WRITE FOR COMPLETE DATA NORGREN BLUEPRINT SL-2



PIONEER AND LEADER IN OIL-FOG LUBRICATION FOR 26 YEARS



Coolant where you need it ... spray is applied to work area from any required direction to thoroughly lubricate critical contact areas between cutting tool and work piece.



Step Up Production Speed. Rapid cooling at the cutting point will enable you to increase both the speed, and the feed of the cutting tool, and still improve workmanship and tool life. Notable increases in machine output have resulted.



COMBINED
SKILLS

### WORKING TOGETHER FOR THE BENEFIT OF ALL TO CREATE . . .

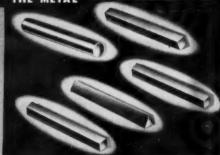
- More Productive Tools
- More Productive Machine Tools
- . More Uniform Quality Carbide
- Lower Costs





Wickes lather used on this lough operation are the result of engineering-design experience gained from many years of solving hundreds of specific machine tool problems.





Wessonmetal uniformity of grade is the key to outstanding performance in single and multiple insert set-ups on all types of material. Every Wessonmetal insert or batch of inserts is engineered to out produce on every type of operation. Wessonmetal uniformity is the result of unique and exacting quality control.



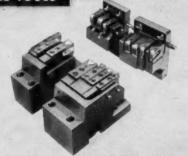
WESSON METAL CORPORATION

FIRST TO TURN CAST

### STEEL CRANKSHAFTS!



TOOLS



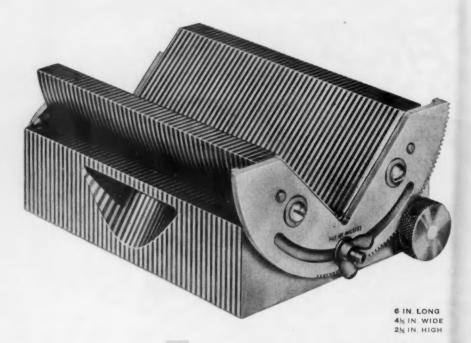
Wesson Multicut Band-Type Tool Holders are tailor-made for single and multiple tool set-ups. Exclusive features include 'built-in flush gage" for quick, accurate insert set-up" in the machine; low cost steel band is replaceable, insert removal slot permits fast and easy insert removal. The body is practically indestructible! Available in over 100 standard sizes— 11 styles!

THE MEN

TOOL ENGINEER TOOL DESIGNER WESSON TIELD ENGINEER MACHINE TOOL BUILDER MANUFACTURING ENGINEERS AND PRODUCTION HEADS

Credit lines above are typical of Wesson's thorough approach to "tough" tooling problems." Working together with the metallurgist, the Tool Engineer, Machine Tool Builder, and the customer, Wesson Field Engineers combine skill and experience in the solution of big jobs like the steel crank and single point tool applications in small production runs!

1220 WOODWARD HEIGHTS BLVD., FERNDALE 20, MICHIGAN



Adjustable
Magnetic
V-Block

For the first time, you can equip your shop or laboratory with a precision Magnetic Adjustable V-Block. This instrument permits your development of profitable new work of close tolerance nature previously impossible with available equipment. In addition, the Anton Magnetic Adjustable V-Block will reduce time and cost in your present grinding operations.

F. O. B. ANTON MACHINE WORKS

Write for illustrated catalog sheet listing price, features and specifications and showing how you can reduce costs and improve quality.

#### **Anton Machine Works**

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Cut machining costs ... standardize with Standard. Complete line ... top quality tools. Backed by factory application specialists coast to coast. Distributors in all principal cities.

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THE STANDARD LINE Twist Orills - Reamers - Taps - Dies - Milling Cutters - End Mills - Hobs - Counterbores - Special Tools





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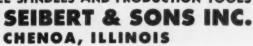
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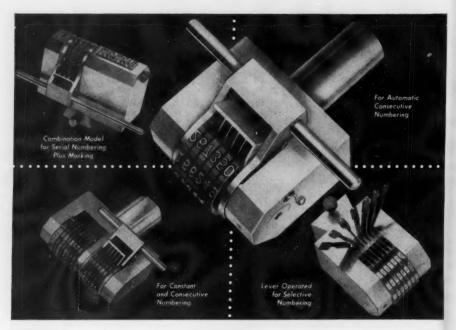
MULTIPLE DRILL SPINDLES AND PRODUCTION TOOLS

for complete details write, phone, or wire









### NOBLEWEST Precision Numbering Heads

Fast, accurate and dependable, Noblewest Numbering Heads are preferred by the leaders in industry. They have unlimited applications for constant, selective and consecutive numbering. Designed for use in either marking presses or Noblewest Roll Marking Machines — wherever permanent numbering is required. Available in a wide variety of automatic, non-automatic and lever operated models with number sizes from 1/40" to ½". Special numbering heads are made to any requirements including embossing heads and numbering heads combined with marking dies. Write to Noble & Westbrook Manufacturing Company, 9 Westbrook Street, East Hartford 8, Conn.



### It's BRAND NEW!



- Replaces Kick Presses
- Reduces Worker Fatigue
- · Ideal for Stamping and Punching
- · For Assembly and Other **Operations**
- 3/4" Stroke 1" optional

the No. 00

POWER PRESS

The latest addition to the



The New Press-Rite No. 00 is a heavy duty 2 Ton Press. Engineered for continuous hard service, ideal for stamping and punching smaller parts and secondary operations such as assembly and others. Eliminates many manual operations and reduces operator fatigue. This press will pay for itself quickly.

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# Camina GUIDE PIN BUSHINGS ... offer yo

### ... offer you all these benefits

- Bronze electroplated on hardened steel\* to combine strength with free, smooth action . . . eliminates seizing and scoring.
- Inside diameter of bronze plated and steel bushings spray quenched to guarantee uniform hardness throughout entire length of bushing.
- 3 Bronze plated and steel bushings strain relieved to hold their size and shape indefinitely.
- 4 Precision manufacturing and rigid inspection to maintain closer tolerances.
- 5 Pre-finished hole to assure full length concentricity, better fit and longer life.
- 6 Honed hole to provide proper surface condition for precision fit and best lubrication.
- Bearing surface extends full length of body . . . increases bearing area up to 25% . . . assures better alignment.
- 8 Figure eight oil groove for complete lubrication over entire area. Also, hydraulic action selfcenters guide pin in the bushing.
- 9 Alemite fitting for easy, positive lubrication.
- Specially designed retainers to securely hold the bushing in exact position . . . eliminates unknown holding strength of press fit.
- 1 Bushings have pre-fitted inside diameters and are wring-fit in the die shoe. This eliminates the possibility of distortion and necessity of hand honing after assembly. Too, positive alignment is obtained by seating the ground bushing shoulder on the finished die shoe surface.
- 12 Complete selection of styles, lengths, sizes and materials to suit any requirement.

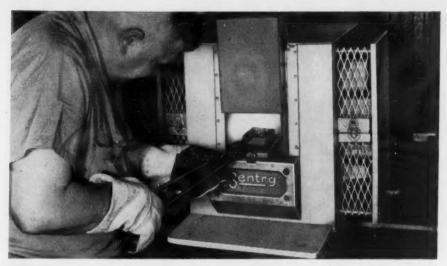
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14925 W. ELEVEN MILE RD.

BERKLEY MICHIGAN

Our illustrated bulletin and price list has all the details. Contact your die set manufacturer or write direct to us for your free copy.

PAT. PENDING



# Clean H.S.S. Hardening is a MUST at LUX CLOCK

At The Lux Clock Mfg. Co. of Waterbury, Conn., an average of 165 special intricate cutting tools, blanking dies and punches are heat-treated daily. Quality, with freedom from scale or decarburization, is a "must" to avoid costly tool spoilage.

By using their Sentry Furnace and The Sentry Diamond Block Atmosphere, Lux say they are assured of consistent quality hardening on all their tools and dies made from high speed or air hardening steels.



A high-carbon, high-chrome blanking die — typical of items heat-treated at Lux.





Request Catalog L-15

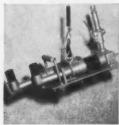
Tells the full story of Sentry Furnaces and The Sentry Diamond Block Method.



4-UNIT MULTIPLE
Suspension from Balancers eliminates weight factor; multiple
seating banishes all torque reaction.



6-UNIT MULTIPLE
All tool Units are interchangeable for use in other multiples if required by model changes.



RIGHT ANGLE MULTIPLE Speeds assembly in hard-toget-at locations; simultaneous multiple seating makes operation safe, easy.





### TREMENDOUS SAVINGS IN LABOR COSTS

WITH THOR QUALITY CUSTOM ENGINEERED
MULTIPLE NUT SETTERS

Production soars, costs go down—when a single operator simultaneously drives up to 8 or more nuts in a single operation with a THOR MULTIPLE NUT SETTER. Built from standard air tool units engineered to accommodate individual spacing of your assembly, capacity range covers all threaded fastener sizes from No. 0 Nut or Screw to 3/4" or more.

Controlled air supply through manifold allows stall-driving to any required torque.

Write for free Bulletin No. JE-1785 describing scores of money-saving applications in all industries.

#### THOR POWER TOOL COMPANY

AURORA, ILLINOIS

EXPORT DIVISION: 330 W. 42nd ST., NEW YORK 36, N. Y.

MAKE YOUR OWN
GAGING FIXTURES
and MACHINE CONTROLS
with

"PLUNJET"

GAGING CARTRIDGES

#### LOW COST-HIGH ACCURACY

- Check any dimension or geometrical relationship
- Controls feed of machine tools precisely
- Tolerance range .100″-.001″
- Amplification range 62.5-5000

- Applicable with any air gage
- Bodies 3/8" square or cylindrical
- Two lengths, 1½" and 1¾"
- Only one moving part
- Immediate delivery
- · Low cost



FREE-WRITE, WIRE OR PHONE

#### PLUNJET ENGINEERING DATA

Tells you in detail how to use PLUNJET Gaging Cartridges with phenomenal success to reduce gaging costs and to control machining to production and even to gage maker's tolerances where desired.

GAGE DIVISION, THE SHEFFIELD CORPORATION, DAYTON 1, OHIO, U.S.A.

6720



CHRICKEN:

### THE LONG VIEW



#### on the buying and leasing of industrial equipment

#### JONES & LAMSON'S 3-WAY MARKETING SERVICE

To further facilitate the expansion of American productivity and markets, Jones & Lamson now offers three plans for the procurement of machine tools.

They are designed to accommodate the widest possible variety of industrial needs, and to establish top industry standards for sound practice.

#### Outright Purchase

The outright purchase of capital equipment is generally preferred. It offers the obvious advantages to the user of lower cost, freedom of operation, and full profit from the use of the equipment.

#### "Pay-from-Productivity" Plan

Plans are also offered for those who prefer making payments from the additional savings created by the use of new and modern machine tools, and on terms more favorable than can be obtained from most credit sources.

Payments may be made on a one to five year basis, in equal monthly installments, with a small down payment and a charge at the rate of 3.25 percent on the original unpaid balance.

(Payment Analysis per \$1,000. Sixty Equal Monthly Payments)
Remaining Total Payment Total Cumulas
Experient Payments Total Cumulas

	Principal	Total Payment During Year	Total Cumula- tive Payments
Payment at Shipme	ent -		250.00
End of 1st year	600,00	190.89	440.89
End of 2nd year	450.00	181.89	622.78
End of 3rd year	300,00	172.89	795.67
End of 4th year	150.00	163.89	959.56
End of 5th year	None	154.89	1.114.45

#### The Lease Plan

Leasing may be advantageous when working capital is inadequate for necessary plant modernization or expansion, and when alternative uses of capital are more pressing or more profitable.

Under the Jones & Lamson plan, the customer gets the normal! year guarantee, and he may offer to buy the machine at the end of any year, at the then existing fair market value or at a predetermined option price.

To provide maximum flexibility, the plan is available in four variations, the principal differences being in the annual rental and return charges. With each plan, a 10 percent deposit is required, to be refunded to customers upon fulfillment of transaction. The minimum payment plan is shown below.

(Annual Rental per \$1,000 Selling Price)

Tricipitate kr	crimin free dex.	OUT THEIR E
Year	Rent	Return Charge
Ist	\$180	\$500
2nd	180	360
3rd	180	240
4th	180	120
5th	180	None
6th	180	None
7th	60	None
8th	60	None
9th	60	None

#### JONES & LAMSON MACHINE COMPANY

521 Clinton St., Springfield, Vermont, U.S.A.

Turret Lathes - Fay Lathes - Thread & Form Grinders - Optical Comparators - Threading Thes

# DRILL UNIT

Combines

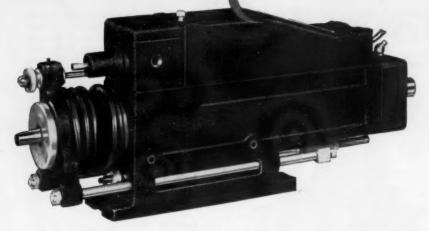
HYDRAULIC FEED

AIR POWERED

RAPID ADVANCE

ELECTRICALLY DRIVEN

SPINDLE



Full 3" stroke — any part usable. Takes up to 5/16" drills. Either pulley driven or direct motor drive models available. Compact, stream-

lined, lightweight. Can be mounted at any angle in any plane. Any number of units can be easily synchronized and interlocked for accurately timed sequence operation.

# WRITE TODAY FOR BULLETIN BL-5

ADDRESS DEPT. MMS-954

919A

The Bellows co.

AKRON 9, OHIO

In Canada:

Pneumatic Devices of Canada, Ltd., Toronto, Ontario

# versatility accuracy economy



# another great new PLUS...

# The CLAUSING VERTICAL MILLER

#### is NOW READY FOR YOU!

The new Clausing Vertical Milling Machine has more Plus Value features than have ever before been available in a miller at or near its price!

It has Versatility Plus! It is actually several machines combined in one. The spindle head can be swiveled in a vertical plane and set at any angle, and turret rotated in a horizontal plane making it possible to mill, drill, bore, ream and shape at all angles, with one setup.

It has Accuracy Plus! The heart of the Clausing Mill is its rigid, high precision spindle head. It has 7 ball bearings — spindle is chrome nickel steel, hardened and ground — quill, hardened and ground, has honed bearing seats — overarm is rigid steel casting with 3/4" thick walls precision ground. All feed screws have ground threads, turn on ball bearings. Table surfaces and dovetail ways on table, saddle, knee and column are precision ground.

It has Economy Plus! The Clausing reduces setup and operating costs. It's low in initial investment, low in upkeep costs.

Write today for the complete story!

#### CONDENSED SPECIFICATIONS

Size of Table	6" x 24"
Longitudinal Table Travel	
Transverse Table Travel	5"
Vertical Table of Knee	12"
Maximum Distance Spindle to Table	12"
Maximum Distance Spindle to Column	83/4"
Quill Travel	3"
Spindle Speeds: Six, 180 to 3250 R.P.M.	
No. 7 Brown and Sharpe or No. 2 Mors Spindle Optional.	e Taper
Operates from 1/2 or 3/4 HP, 1725 R.P.M. A	Actor

MILLS, DRILLS, BORES, REAMS AND SHAPES . . . AT ALL ANGLES . . . WITH ONE WORK SETUP!

CLAUSING DIVISION, atlas Press. Company 9-110 NORTH PITCHER STREET, KALAMAZOO, MICHIGAN





Modern Procunier Tappers are Streamlining Production Methods . . . Everywhere!

> If you are now using ancient, troublesome tapping equipment, you are needlessly increasing operating costs, seriously impairing production and adding to your maintenance expense. Out-of-date, over-used models are incapable of attaining the streamlined efficiency that modernized industry is demanding. Progressive industrial users who recognize the need for high speed, accuracy and efficiency, are turning to Procunier Tappers as the solution to their steadily mounting production and spoilage costs. Procunier Tappers invariably produce more pieces per hour with fewer rejections, fewer spoiled pieces and a minimum of broken taps.

> Designed for today's tough production conditions, they incorporate many unique and exclusive construction and operating features. Best of all, they're made to "take it" and provide you with many more profitable "operating hours" and less costly down time inter-

> Procunier tapping heads are priced low enough to make it economically possible to rid your plant of obsolete tapping heads NOW!



# Procunier

Safety Chuck Company 12 S. CLINTON ST., CHICAGO 6, ILL.

#### Write for FREE Brochure

giving full details, specifications, diagrams and work drawings on the complete line of Procunier tapping heads and accessories. See how they can fit into your present plant pattern.

#### PROCUNIER SAFETY CHUCK CO. 12 S. Clinton St.,

Dept. 4 Chicago 6, III. Gentlemen: Please send your Itlustrated brochure giving complete details, specifications and prices on the improved line of Procunier High Speed Tapping Heads.

Address ..... Zone ... State ....



# the Moore-Fosdick

## The only machine of its kind in

- Greater range-22" x 42" x 27" height Automatically positions work to ±.0001"
- Grinds jigs, dies, punches, templates and machine parts Infinite Grinding Speeds—12,000 to 60,000 rpm
   Contour and Chop Grinding Slot Grinding Attachment Spindle-Housing Heat Control

This new machine combines the unique Moore Jig Grinding Head with the exclusive Fosdick Automatic Positioning Table. It gives you greater capacity for precision grinding with the speed and convenience of a table that automatically positions work to ± .0001". There is no other machine in the world that even approaches the Moore-Fosdick in jig-grinding capacity, versatility, concenience and precision!

Grinds Cylindrical and Tapered Holes. The Moore-Fosdick allows you to grind cylindrical as well as conical holes, with taper in either direction. An artgular and indexing device built into the main spindle, and the newly developed slot grinding attachment, permit the quick, accurate grinding of any contour-regular or irregular.

Large Work Capacity—Infinite Number of Speeds. The Moore-Fosdick A. P. Jig Grinder has an infinite range of grinding speeds – from 12,000 to 60,000 rpm. . . allowing extreme versatility and accurate control of grinding and stock removal. Larger table size and greater work height, coupled with greater power, extend the overall range of precision grinding operations.

#### SPECIFICATION S

Capacity :	No. 30-G	No. 42-G & No. 42-I
Table size	36"x18"	44"x22"
Table travel, Longitudinal.	30"	42"
Table travel, Crosswise	171/2"	22"
Table top to wheel collet	2" to 27"	2" to 27"
Spindle to column ways	18%*	1814"
Spindle to column	20"	25%"

Four spindle speeds: 90, 120, 180, 240

Spindle feeds by air-powered hydraulic control infinite speed control

Grinding speeds: 12,000 to 60,000 rpm; 3 heads

#### Grinding Capacity:

With grinding wheels, 1/4" to 5" (8" with adapter) With diamond mandrels 1/4" to 3/4"

Travel main spindle slide ... 3%"

Angular adjustment of spindle up to 1½° either way or 3° included angle.

Radial offset of grinding spindle-from center to  $1\,\%$  off center by rough adjustment-while running  $0.0001^{\circ}$  adjustment for distance of  $0.075^{\circ}$  anywhere in the  $1\,\%$  range.

#### Weights and Floor Space:

Weights and Floor Space:	Me. 30-0	NO. 41-0 & NE. 4
Machine with regular equip- ment, including motor Shipping weight	6000 lbs. 6750 lbs. 77"x82"	11,000 lbs. 12,000 lbs. 102"x128"

#### Standard Equipment:

Four-speed constant torque ¼ hp motor, 220-440 volts, 50-60 cycles, 2-3 phase, wheel dresser—micrometer stop-wrenches. Two built-in locating devices: two 1°, 2001 inside micrometers; two 1°, 2°, 3°, 4°, 5°, 10° and one 15° end measurers in box.

#### Compressed Air Requirements:

90 to 100 lbs. (i) 15 cfm, furnished by customer. We recommend a heavy-duty 7.5 hp air compressor with a water after-cooler, provided it is capable of this output.

•42-PG Moore-Fosdick Jig Grinder with Automatic Positioning.

Write today

for price and delivery information.



Positions Work Automatically to ± .0001". With the Automatic Positioning Table, you can get fast and accurate positioning of parts to be ground. Two simple duplicating bars may be prepared to position work automatically to ± .0001"—at the touch of a pushbutton. This means that complex grinding jobs with hundreds of holes require only one set-up. On "one-time" jobs, measuring rods can be used in place of bars. For precision production jobs, the easilymade, easily-stored duplicating bars give you a permanent record of positions. Once a job is run, you store the bars and use them every time you rerun that

same job - weeks, months or years later.

Grinder Head Dimensional Stability. Latest design of the grinding head incorporates new features to improve further its stability. These include: (1) Electric heating elements in the main spindle housing to maintain uniform temperature whether machine is running or not; (2) An observation thermometer so located as to indicate any temperature change within the housing; (3) The housing itself is cast from 36% nickel iron to reduce the effect of any possible temperature variation to an irreducible minimum.

## Need Drilling Equipment? Get a Proposal from Fosdick!







Sensitive and



Sensitive







THE FOSDICK MACHINE TOOL CO., CINCINNATI 23, OHIO

# APEX screwdriver bits proved better!

APFX Insert Bits for driving Phillips screws



STANDARD LENGTH



LONG LENGTH



#### HEAVY DUTY

for use with impact tools.

Again-Apex screwdriver bits have been proved better, outperforming competitive bits by a margin considerably better than two to one. This impartial test was conducted over a twomonth period by one of the nation's largest producers of automobiles. The Apex bits used in the test were standard production bits, taken from tool crib stock. Detailed records of performance proved Apex bits outlasted others on the basis of hours used.

Apex-specialists in screwdriving-has the solution to your production screwdriving problems. Choose from magnetic or standard hand drivers, and bit holders to fit air, electric or

SCREWDRIVER BIT COMPARISON TEST

Project To determine which Phillips screwdriver bit delivered the most efficient performance, at lowest tool cost. Ouration of Test: Two months.

Type of Test: Routine production screwdriving operations.

Results of Test: APEX screwdriver bits outperformed other bits by better than two

Conclusion: Continued use of APEX bits recommended for all production screwdriving operations.

> spiral drivers, for use with Apex insert bits to drive Phillips, Frearson (Reed & Prince), Slotted, Clutch Head or Socket Head screws. Power bits, hand drivers, service drive bits, hand brace bits, offset drivers-whatever your needs, you'll find Apex has the answer.

## Catalog 21 — The authority on screwdriving

Comprehensive listings of all Apex production screwdriving tools, with complete specifications and prices. Fully illustrated and sectionalized for quick, easy reference. Write, on your company letterhead please, for your copy.



# screwdriving tools

THE APEX MACHINE & TOOL COMPANY 1027 S. Patterson Blvd., Dayton 2, Ohio

# SANFORD SURFACE GRINDER MODEL MG

For Dry or Wet Grinding!
PRECISION . SPEED . SENSITIVITY

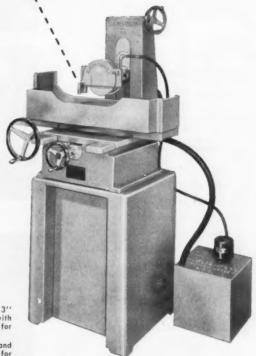
Built by manufacturers who concentrate on small grinders only, each Sanford Grinder is an individual project of time tested and proved basic design. Although modest in price, no quality undermining shortcuts are employed to reduce manufacturing costs. Constant repeat orders prove its acceptance.

This sensitive machine grinds to micro-inch accuracy with no vibration, with maximum dimensional stability. Here's why:

- Transverse ways are double Vee (VV) Meehanite inserts instead of flat surfaces which depend upon unstable jibs for alignment and accuracy.
- Needle, Ball and Oilite Anti-Friction bearings are used throughout.
- Alignments are electronically checked for accuracy.
- Precision slides are ground, lapped and hand spotted.
- Dials are large and legible.

SPECIFICATIONS - 83/4" transverse - 13" longitudinal-12" vertical under 7" wheel with Adapter. Approximate weight 630 lbs. Send for illustrated bulletin.

Replacement parts, special attachments and reconditioning facilities are available. Send for price list.



\*With optional equipment



1022 Commerce Ave., Union, N. J.

# GEAR COSTS

#### FOR CHECKING INVOLUTE PROFILES

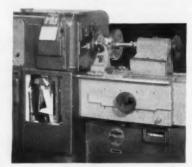
Two Fellows Involute Measuring Instruments with capacities of 12 and 24 inches p.d., electronic recorders, chart readings at 500 to 1 magnification.



VVV

#### FOR CHECKING LEAD

Fellows Lead Measuring Instruments also in 12 and 24 inch capacity, chart errors at 500 to 1 magnification, also for checking crown and taper; no involved calculations.



VVV

#### FOR COMPOSITE CHECK

Fellows Red Liners in 3 capacities up to 18 inches p.d. automatically record all gear errors in combination on a chart as the precision master gear rotates in contact with the gear being checked.



VVV

THE

under Control

with Chart-recorded Inspection

~~~~

~~~

VVVVVVVVVV

You can rely upon Fellows Inspection Instruments for quality control in your gear department. The permanent-record chart gives proof-positive that limits have been met before costly assembly.

There's a Fellows Instrument for every gear inspection purpose from the bench-type hand rolling instrument to the complete line of electronic automatic-recording types. Literature and sales-engineering advice on any or all is yours for the asking. Contact the Fellows office nearest you.

FELLOWS GEAR SHAPER COMPANY

Head Office and Export Department: 78 River Street, Springfield, Vermont.

Branch Offices: 319 Fisher Building, Detroit 2 • 5835 West North Avenue, Chicago 39

2206 Empire State Building, New York 1



# CENTRIFUGAL PUMPS

Circulate and pump coolants where volume is essential with low head pressure

# GET ALL THESE IN EVERY FULFLO



MODEL FVMS Vertical MODEL FHMS Horizontal

- constant pumping action
- chips or grit cannot interfere
- spring tension packing prevents leaks
- · no bearing in pump to wear out
- pump shaft replaced easily
- · automatic adjustment · carbon seal, if desired
- · splashproof, ball-bearing motors

Belt, motor or direct drives. Capacities: 1/4 to 1 hp; Vertical or horizontal installations.

pipe sizes 3/8" to 11/2".

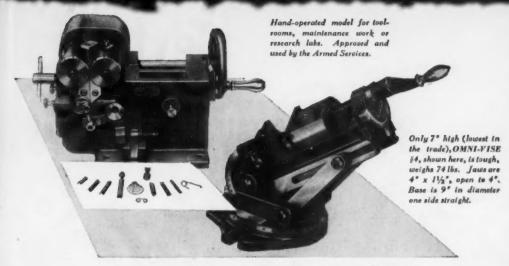
flanged mount; 1/4 placement pump shaft.

Motor drive: WRITE FOR FULFLO hp; 30 gal. per MECHANICAL DATA BOOK min., spring ten- on your letterhead. Please sion packing; re- state if for Pumps, for Valves or for both.





THE FULFLO SPECIALTIES CO. Inc. PUMP AND VALVE MANUFACTURERS BLANCHESTER, OHIO



# new slant on shop profits!

When you need a replacement or experimental spring, any shape, diameter or pitch from flat or round wire sizes .005" to .125", you can produce it in a matter of seconds with the new Perkins Precision Spring Coiler! You entirely eliminate the use of

springs sion, ex special sy left or ri sired let from 1/6 with or sion, and ends. I special or

Power model for continuous runs, on welded steel console base.

arbors, yet turn out precision springs - torsion, compression, extension tapered, or special springs - coiled either left or right hand, in any desired length, any diameter from 16" to 12" and larger, with or without initial tension, and with open or closed Eliminate expensive special orders and costly production delays! Make your own springs to exact specifications for replacements or experimental work. them fast right in your own shop!

WEST SPRINGFIELD, MASS.

PRECISION MACHINE
TOOLS

Connors and Davis
Sales Corporation
Circuit Avenue



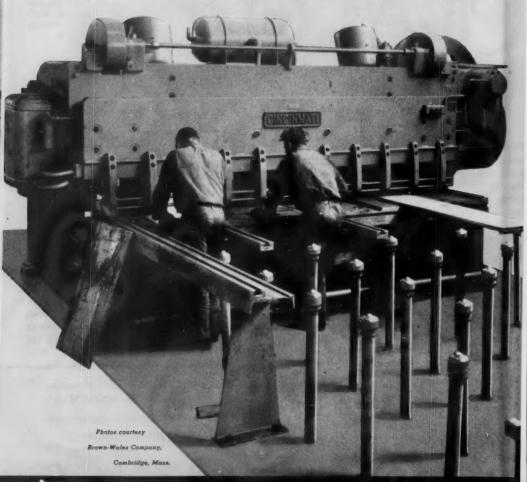
Accurately set in all threeplanes in only 15 seconds, this sturdy precision vise made in two capacities saves time and headaches for progressive shop operators and pays for itself quickly. Only

7" high (lowest in the trade), **OMNI-VISE** #4, shown at top, is tough, weighs 74 lbs. Jaws are 4" x  $1\frac{1}{2}$ ", open to 4". Base is 9" in diameter with one side straight. Inset shows **OMNI-VISE** #2, a precision, low-priced vise. Users find it exceptional for grinding compound angles on carbide tools. Weight, 16 lbs. Height,  $4\frac{3}{4}$ ". Jaws,  $2\frac{1}{8}$ ". Opening,  $2\frac{1}{8}$ ". Base,  $7\frac{1}{4}$ " x 5". For grinding, drilling or general work at any angle, by hand or machine, an **OMNI-VISE** is the machinist's choice.

| chinist's choice.                              |                     |
|--|---------------------|
| CONNORS AND DAVIS<br>09 Circuit Avenue, West S |                     |
| Please send detailed informa                   | tion and prices on: |
| PERKINS SPRING                                 | COILER              |
| OMNI-VISE                                      | #4 🗆 #2 🗆           |
| Name   | Title               |
| Company  |                     |
| Address  |                     |
| City   | State               |
|  |                     |

# **Test cuts**

by accurate performance of





THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A.

SHAPERS . SHEARS . BRAKES

# eliminated CINCINNATI Shears...

#### Brown-Wales Company says:

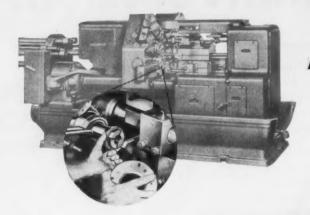
"As a steel warehouse, we have comparatively few production jobs, however, we have found that our men with this new shear can turn out far more work in an hour or a day than they could with the old one. In the first place, the power operated back gauge is a great time-saver when changing, as we frequently do, from one job to another.

"Secondly—the greater accuracy of the shear has made test cuts unnecessary, so that down time between runs is greatly reduced."

Write for Shear Catalog S-6.



# GREENLEE



## COLLET AND FEED FINGER ARRANGEMENT

SET-UP TIME

All six collets and feed fingers can be quickly and easily changed without indexing the spindle carrier. The collets are changed by simply removing the spindle nose nut. Greenlee collets are operated, as illustrated in the drawing, by the action of a sliding sleeve over the taper of the collet. The nose nut holds the collet in a fixed position inside the spindle, thus eliminating any endwise movement. As a result, none is transmitted to the stock, and this provides for accurate stock feed-out.







#### CHANGING PUSHER TUBES

A few turns of a wrench moves the head of the stock-reel backward to afford the operator plenty of room to change the stock pusher tube assemblies, after releasing and indexing retainer plate.



Write for FREE Literature



GREENLEE BROS. & COMPANY, 1889 MASON AVE., ROCKFORD, ILL.

MULTIPLE-SPINDLE GRILLING, BORING, TAPPING MACHINES . AUTOMATIC SCREW MACHINES . AUTOMATIC TRANSFER PROCESSING MACHINES

# Webber "LABORATORY MASTER" Gage Blocks

Set a New Standard of Accuracy in Dimensional Control

Webber "Laboratory Master" Gage Blocks are the nearest approach to absolute dimensional perfection ever attained. They enable the manufacturer of precision products to enjoy the benefits of incredible accuracy—accuracy which, even a few short months ago, was considered almost impossible to attain.

This remarkable advance in dimensional control, which to all intents and purposes  $\underline{is}$  absolute perfection, is the result of three things:

- (1) Human skill and "know-how", which comes only from many years of experience.
- (2) Croblox (Chrome Carbide), the material used, has no equal for durability, resistance to corrosion and fine grain structure. The "mirror" finish as imparted by Webber to the Croblox gaging surfaces will not accept oxidation, corrosion or even a microscopic film, any of which would impair the fantastic accuracy of the gages. Surface finish is so smooth that it can be checked only by the Interference Microscope.
- (3) The final checking of each gage block in the Webber Laboratory employs the new Zeiss Opton Interferometer ("interference" method), the most accurate system known to modern science.

#### Webber "Laboratory Master" Gage Blocks Are Essential Equipment for the following:

Ball and Roller Bearing Mfrs. . . . Gage Block Mfrs. . . . Plug, Thread and Ring Gage Mfrs. . . Precision Instrument Makers . . . Machane Electronic Devices . . . Elementary Standard for Physical Laborateries.



#### **Technical Information**

| Parallelism - across width   | *  |  |   |  | .000001"   |
|------------------------------|----|--|---|--|------------|
| -along length                |    |  |   |  | .008001"   |
| Flatness — across width .    |    |  |   |  |            |
| -elong length .              |    |  | * |  | .000002"   |
| Deviation from marked si     |    |  |   |  |            |
| Calibration by Interferement | ry |  |   |  | ±.0000002" |
| Accuracy of Calibration .    |    |  |   |  |            |
| Coefficient of expansion, pe |    |  |   |  |            |

Surface Finish . . . by optical comparison, equal to a quartz flat.

Corrosion resistance—approx. 10 times that of 18-8 Stainless Steel

Material—Chrome Carbide

The Webber Laboratory is maintained at a constant temperature of 68 degrees F. 365 days in the year. The "Laboratory Master" Gage Blocks are intended to be used where constant temperature is maintained. Under such conditions they may be accepted as the final word in accuracy.

Each set bears its own individual serial number and is accompanied by a notarized officiavit certifying the accuracy of the 82 blocks comprising the set. The readings are guaranteed accurate within plus or minus one millionth of an inch.

Due to the extreme care and precision required during the intricate production processes together with the many phases of checking and rechecking during final calibration, from sixty to ninety days are required for delivery.

Price \$185000

# Weller GAGE COMPANY

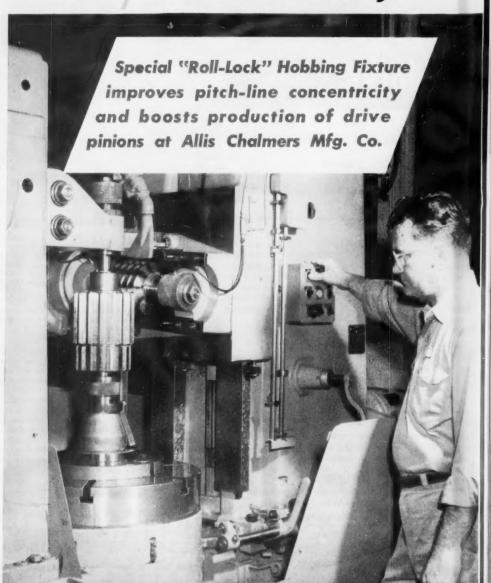
12899 Triskett Road

· Cleveland 11, Ohio

SCULLY

# "Precision

make hobbing...and



# Holding" Tools

# other machining jobs more profitable

Provides accurate, centering, shrink fit on ground hub of pinion.

It's a new way of holding and driving the work for hobbing ... as accurate as holding between centers ... faster and more accurate than conventional chucking.

This Scully-Jones special "Roll-Lock" Chucking Fixture easily increased production of tractor drive pinions 10% by reducing handling time and increasing rigidity to permit

heavier feeds.

Pitch-line concentricity and accuracy of involute were improved because the solid compression shell applies equal force evenly around the ground hub of the pinion, accurately centering it and eliminating clearance or play. Hob life and finish also were improved.

Use of Scully-Jones standard or special "Roll-Lock" Chucks, Arbors and Mandrels on a variety of your machining operations will be just as profitable. Read about wide range of application in Bulletin No. 17-50.



Special "Roll-Lock" Chuck is bolted to work spindle of Gould & Eberhardt gear hobber, Spacers adapt if to various hub lengths. Split collets are used to accommodate different diameters.

# THE SCULLY-JONES TOOL BUYER'S GUIDE

Heavy-Duty Tap Holders—Special alloy steel, hardened by toughening process, resists nicking and burring . . . keeps large taps running true. Shank and hole concentric within .002". Bulletin No. 4-50.



Center Drill Drivers—Accurately drive combined center drills and countersinks (regular and bell types) because bore and shank are precision finished. Flutes drive off spline section of bore. Countersunk hole protects drill tip. Bulletin No. 1-50.



Close-Center Tap Drivers—Give maximum clearance between centers or near shoulder. Permit use of hand taps in place of pulley taps and special length taps. Improved design assures long life. Bulletin No. 4-50.



**Drill Steps**—Use them on turret lathes, radial drills and other machines to control depth of hole. Save time on sequence operations using quick-change setup. Bulletin No. 18-50.



Quick-Change Chucks—Change tools fast on sequence drilling, reaming and apping operations without stopping machine. Merely lift locking ring, and collet with culting tool drops out. After inserting new collet, release ring and new tool is ready to cut. Bulletin No. 3-50.



Sleeves, Sockets, and Turret Tool Holders — Hardened-and-ground precision sleeves reduce any ASA or Morse taper hole to smaller taper. Short, medium and long series extension sockets, and short, sleeve, and extension type turret tool holders in range of sizes. Bulletin No. 7-50.



Milling Arbors—Styles "A" and "B" give rigid, accurate drive on machines having National Standard spindle end, Arbor and pilot dia. held to +.0000", -.0005". Faces of spacers and bearings parallel within .0002". Bulletin No. 2-50.



Milling Machine Adapters—Shell end mill arbors (illustrated) available in range of sizes and styles. Callet



of sizes and styles. Collet holders, cutter chuck adapters, centering plugs and other adapters from stock. Bulletin No. 2-50.

Solid Spacing Collars— Do not "spring" arbors because faces parallel within .0002". Keep cutters running true. Bulletin No. 2-50



Arbor Bearing Sleeves—For standard styles "A" and "B" arbors. Bore and O. D. concentric within .0005"; faces parallel within .0002". Butletin No. 2-50.

Live Centers — Use them for high speed turning without losing accuracy. Large bearing surfaces absorb shock loads easily. Runout within .0002"T.I.R. Bulletin No. 9-50.



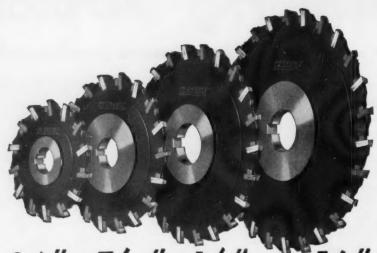
Work Rest Blades—TC tipped segment type blades for through feed, infeed and roller infeed grinding, Bulletin No. 11-50,

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"Precision Holding" for holding precision

SCULLY-JONES AND COMPANY, 1909 S. ROCKWELL ST., CHICAGO 8, ILL.



# 3/8" - 7/16" - 1/2" and 5/8" THIN SLOTTING CUTTERS

4''-5''-6''-8''-10'' and 12'' in diameter with  $Gack-Lock^{\otimes}$  blade locking wedges

• Developed by McCrosky, these new cutters combine the rigidity of solid slotters with the greater economy—longer life—the easy, positive locking of each blade—and the quick release and accurate blade adjustment of McCrosky's shopproved Jack-Lock Wedge. Locking pressure of the wedges against the alternate right and left hand milled and ground blades is parallel to the sides of the cutter, avoiding any side stress, warping or misalignment. Easily converted into half side cutters by simply inserting blades all of one hand. New bulletin gives dimensions and full details. Write for Bulletin 17-M today.

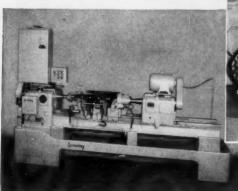


Engineering and Sales Representatives in the Principal Cities

# MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE So-owing PEOPLE" SENECA FALLS. NEW YORK

Lo-wing Model CS Automatic Drilling and Centering Machine equipped with Automatic Handling Mechanism and Special Vises.

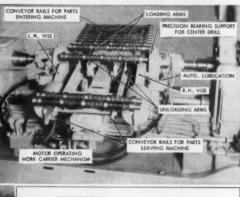


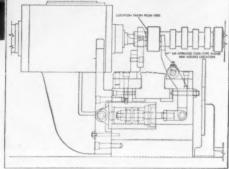
## AUTOMATIC HANDLING CUTS CAMSHAFT CENTERING COSTS

PROBLEM: To automatically handle and center both ends of eight-cylinder camshafts.

SOLUTION: The standard Lo-swing Model CS Automatic Drilling and Centering Machine selected for this job was equipped with a special Automatic Handling Mechanism and special vises. The close-up illustration provides a rear view of the vises, loading and unloading arms, and rails which guide the camshaft through the machine.

The camshafts arrive at the machine from the previous operation by conveyor and roll down to a fixed stop on the loading rails. At the end of the machine cycle, the center drills retract and the vises open. allowing the finished piece to drop into a stationary cradle, which is positioned slightly lower than the center line of the vise jaws. An electrical contact then starts the work carrier motor, imparting a rotating movement to the work carrier arms which handle a rough and finished piece simultaneously.





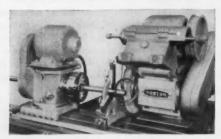
The unloading arms remove the finished piece, depositing it on the conveyor rails leaving the machine, while the loader arms, in their trajectory, pick up a rough part and lower it into the vise jaws where it is automatically clamped in position. The machine starting clutch is then automatically engaged and the part centered, which completes the cycle. The entire operation is automatic, no operator being required.

The close-up illustration shows a finished part being removed from the vises and a rough part just being lowered into the vise. The line drawing shows the details of the automatic positioning stop attached to the left hand vise. Seneca Falls engineers are at your disposal for solving your AUTOMATION problems.

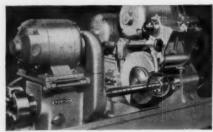
PRODUCTION COSTS ARE LOWER WITH So-swing



He can change-over fast from this internal grinding set-up on the Norton 10" x 20" Universal grinder. The internal grinding spindle, permanently hinged to front of wheel side, swings up out of the way - and he's ready for external, face or angular wheel slide jobs.



Hollow spindle in headstock allows work up to 1" diameter and longer than machine to be passed clear through.



Dead center grinding - note chuck mounted at opposite end of head, a real set-up time saver.

# Quicker set-ups here

# increase your profit margin

# on many different grinding jobs

Norton 10" x 20" and 10" x 24" Universal Grinding Machines are famous for versatility, accuracy and fast, smooth performance

Do you want to save valuable time on many grinding jobs? Want a multi-purpose machine for rough cuts or finest precision finishing?

Then you want the Norton 10" x 20" or 10" x 24" Universal Grinder . . . that helps you produce more work at less cost.

The Norton 10" Universal is a multi-purpose grinding machine that can do external, internal, face and angular wheel-feed grinding.

Head and footstock are interchangeable, permitting simplified set-up on jobs involving shoulders or spacers, especially an angular grinds. Set-ups are made easier on chucking jobs by the D1-3" camlock nose on one end of the headstock spindle, and the provision for permanent chuck mounting. The headstock is easily swivelled 180° to change from dead center to chucking work.

The wide versatility of this machine proves once more that you economize when you modernize with a new Norton machine. For complete information see your Norton representative or write for Catalog 170-3. Norton Company, Machine Division, Worcester 6, Mass.

To Economize, Modernize With NEW



**GRINDERS** and LAPPERS

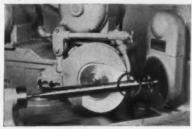
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Norton 10" x 20" Universal Grinding Machine. Wheel head swivels 360°. Internal spindle hinged to front of slide and swings up out of way when grinding external work.



Head and footstock are reversible. No need to change wheel and drive to the other end of spindle.



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## 1/4 H.P. CONVERTICAL MILL HEAD

Only low cost mill head with quill travel attachment.

High speed medium-light operation. For bench, floor and pedestal mills.

Fits milling machines with overarm 1½" to 3".
%" end mill capacity.

\$24500



# RUSNOK

# 1/2 H. P. MILL HEAD

HEAVY DUTY MILLING ATTACHMENT Fits milling machines with 3" to 5" overarm.

34" end mill capacity.

For vertical, horizontal and angular operations.

## 1 H. P. MILL HEAD

HEAVY DUTY MILLING ATTACHMENT

Fits milling machines with 3" to 5" overarm.

34" end mill capacity.

For vertical, horizontal and angular operations.



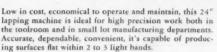
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PUT "LIGHT-BAND" ACCURACY IN YOUR TOOLROOM

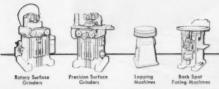
...with a 24" Taft-Peirce Precision Lapping Machine — Only \$1,075



The lapping area is a full 24" in diameter. Plates are of close grained cast iron, heat treated and precision ground to ensure permanent flatness. The spindle is roller bearing mounted, and the base construction is of extreme rigidity.

The plates (grooved for flat or plain for cylindrical pieces) are interchangeable in only a few minutes' time. Plain plate is standard...machine furnished with grooved plate is \$1100.

For more information on this and many other Taft-Peirce toolroom items, send for your copy of the Taft-Peirce Handbook.





THE TAFT-PEIRCE MANUFACTURING COMPANY, WOONSOCKET, RHODE ISLAND





It's easy to check on Junior's vision these days with standard eye charts. And for half a century there's been a standard in tool steels, too - Crucible REX® High Speed Steel. Try REX High Speed Steel in your own shop as thousands all over the world have done. Use it under the toughest conditions . . . compare its performance with all other high speed steels. You'll find that absolutely nothing beats REX

on your next purchase of high speed steel, specify That's because REX High Speed Steels are unsurpassed in structure, finish, carbide distribution, response to heat treatment and general uniformity. So, REX – made only by Crucible.



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TOOL STEELS

CRUCIBLE STEEL COMPANY OF AMERICA . TOOL STEEL SALES . SYRACUSE, N. Y.

Canadian Distributor - Railway & Power Engineering Corp., Ltd.



operator's hands and he'll remove the same amount of metal he formerly did with a 10 pound tool! It's the CP-3190 . . . designed for driving cup wire brushes and grinding wheels, sanding discs, and cut-off wheels! Here are the features that tell why the CP-3190 takes a beating, yet is seldom down for repairs:

- · Splined type floating rotor prevents end-plate wear from wheel thrust.
- · Continuous lubrication afforded by large oil reservoir and built-in lubricator.
- · Safety governor valve cuts off air supply in the event of possible governor failure.

Available in speeds to 8000 RPM, in capacities capable of handling 6" cup wheels, and 7" and 9" disc sanding pads and cut-off wheels.



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58

# when mistakes



Automotive crankshaft being brought up to inspection standards with metallizing. This automotive manufacturer formerly used plating for this type of salvage, worked one per hour. With metallizing, the salvage operation requires only 5 to 10 minutes per shaft, including surface preparation.

## Free Bulletin



Get the full story on metallizing in production salvage. Bulletin 57-C describes and illustrates the procedures, provides data on typical parts, with interesting photo-micrographs showing the unique bonding action of Sprabond Wire. Send for a copy.

METALLIZING ENGINEERING CO., INC.

1111 PROSPECT AVE. WESTBURY, LONG ISLAND, N. Y

In Great Britain: Metallizing Equipment Company, Ltd. -Chobham near Woking, England ... and they do in any busy machine shop, there's no need to scrap a mis-machined or otherwise damaged machine part that represents an investment of many expensive man-hours. Parts like these are brought up to inspection standards quickly,

easily and inexpensively with metallizing.

And with the new molybdenum metallizing wire, Sprabond, the only surface preparation required is cleaning. The molybdenum forms a molecular bond with the surface being rebuilt. Little heat is generated, eliminating any danger of warpage.

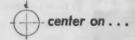
What's more-users have found that the extreme hardness of the molybdenum coating, and its microscopic porosity which provides superior lubricating characteristics, improve its "wear-ability" over ordinary bearing surfaces as much as 25 times. You haven't just salvaged a part-you've improved it.

The trade name, SPRABOND WIRE, is the property of Metallizing Engineering Co., Ir

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|----|--------|------|-------|---------|---|
|    | Please | eend | me B  | ulletin | 57-C.                                   |
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| Co | mpany. |      |       |         |   |
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# LATHEDOG LEARNS ABOUT CABINET BASES





For a clear comparison of Cincinnati Lathes with other equipment, write for a free copy of "Management Facts About Lathes."

# cincinnati

60

# J.R.WILLIAMS

YEAH! THEY
SQUEAKED SO
LOUD LATHEDOG
THOUGHT IT WUZ
THE LEAD SCREW
AND KEPT USIN'THE
OIL SHOT
PLUNGER!



Large size prints of this J. R. Williams cartoon are available for framing.



It's amazing the amount of stuff you can store in those handy cabinet bases. But even more amazing is the number of high-priced features you'll find on low-priced Cincinnati Lathes,

- 1. All geared headstock
- 2. 12 spindle speeds in geometric progression
- 3. Direct-reading speed-shifting mechanism
- 4. Large spindle mounted in three antifriction bearings
- 5. Flame hardened gears in headstock, quick change box and apron
- 6. Cabinet legs with built-in leveling jacks
- Enclosed quick-change box with lead-screw reverse
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- 9. Ground ways (flame hardened at extra cost)
- 10. Tray-Tops on headstock and tailstock
- 11. Double-walled apron with automatic lubrication
- Fully enclosed electrical panel, built-in disconnect, transformer, motor and controls (all standard equipment)

We also make a complete line of floor, bench and radial-type drilling machines.

For complete catalogs, prices and name of your local dealer, write on company letterhead to Cincinnati Lathe & Tool Co., 3264 Disney, Cincinnati 9, Ohio.

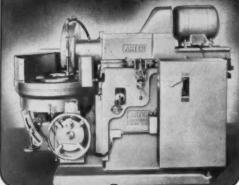
# lathes and drills



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The Arter trademark on these machines is the sign of ACCURACY • POWER • DEPENDABILITY. Tell our engineers your grinding problems. They'll find a way to lick them.

ARTER GRINDING MACHINE COMPANY
WORCESTER MASSACHUSETTS

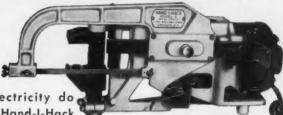
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**POWER HACK SAW** 



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Cutting small diameter brass tubing, using wood block false jaws.



Making a square cut on solid 3" steel bar.



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Monufacturers of Automotive Clutches and Machine Taols

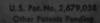
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The Cross Tool Control Unit reduces tool costs, decreases machine downtime. Available in four different sizes, it can be used with most types of metalworking equipment.

Here's what it does:

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**Combine Operations to Lower Costs** 

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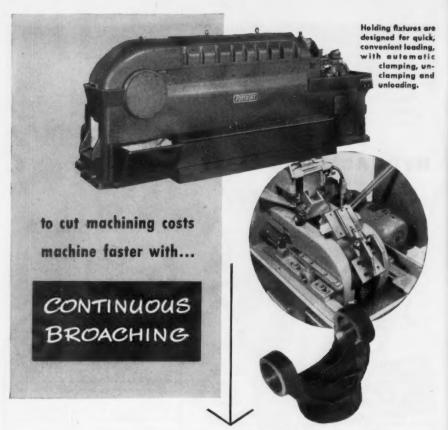
If you need a fast, versatile, accurate Hydraulic Press in your plant - one that converts in seconds from one set-up to another. give us a call. We make a full line of one, two and three cylinder Hydraulic Presses; 25-150 ton capacities; hand, air or motor driven. Write for complete specifications and prices or see your machinery dealer.

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- · Heavy Construction Throughout, Bed and Crown Members Truss reinforced for Added Stiffness and Strength. A KRW Exclusive Feature.
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#### Cut Faster • Last Longer Produce More Accurate Holes

#### with OLIVER DRILL POINTERS

To obtain best results from your twist drills, you must use correctly sharpened drills. Twist drills machine-ground the Oliver Way assure uniformity, last from 2 to 3 times longer than hand-ground drills. The balanced cut obtained with OLIVER DRILL POINTERS means that each lip of the drill does equal work—makes more perfect holes.

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machine . . . increase their wearing life and efficiency . . . machine-grind them with





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Air hardening tool steel of the 5% chromium type is available in flats and squares, precision ground, for long-run or out-of-the-ordinary applications.

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Write for BULLETIN E-94

# 21/4 hrs. 100W 9 hrs. before

Fairbanks, Morse & Co., Beloit, Wisconsin, is really putting the payroll dollar to work with its new 20 inch "AMERICAN" Heavy Duty All-Hydraulic Duplicating Lathe.

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With production costs constantly reaching new peaks, industry simply can't afford to ignore such savings from modern equipment. Where else could such a magnificent return upon an investment be secured, and how else can costs be lowered to meet an increasingly competitive market?

More production per man hour is the answer and the only answer to prohibitive costs—modern, high production machinery is the answer to greater production per man hour.

Put your payroll dollar to work for greater profits with "AMERICAN".

Bulletin No. 35 shows many examples—it's yours for the asking.





The "Panto-Miller"

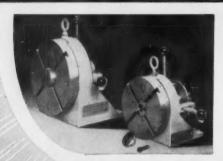
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A sturdy, production tool for 2-dimensional cutting in steel, cast iron, nonferrous metals and plastics.

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"Those who buy Gilbert buy Gilbert again" because of the efficiency of the single spindle and unit head design, ample capacity for most boring requirements, plenty of power for fast and heavy cuts with carbide tools, sustained accuracy in long, hard service. 31/2-inch spindle, table and floor type boring mills available in a wide variety of arrangements. Write for Bulletin 953.

#### GILBERT

THE CINCINNATI GILBERT MACHINE TOOL COMPANY . 3366 BEEKMAN STREET, CINCINNATI 23, OHIO



#### CARBIDE PLUG GAGES

TUNGSTEN CARBIDE
wire type .016" to .500" dia.
CHROME CARBIDE
taper insert type .500" to 1.510" dia.

In addition to its regular line of tungsten carbide wire type plug gages from .016" to .500" diameter, The Van Keuren Company now offers a new line of chrome carbide taper insert plug gages in the range from .500" to 1.510" dia. Van Keuren tungsten carbide wire type gages have proved their worth on thousands of tough gaging jobs. The new chrome carbide taper inserts (Carboloy, grade #608\*) promise to be equally effective. Wearing qualities of chrome \*Tredemark of the Carboloy Dept. ef General Electric Ce.

carbide are comparable with tungsten carbide In addition, the material is lighter than tungsten carbide and has a coefficient of expansion close to that of steel . . . both of which factors are a distinct advantage in the larger sizes. Finish on Van Keuren gages in either tungsten carbide or chrome carbide will average .5 RMS or better. These gages are available in Class Y, X and XX accuracies at moderate prices and on a reasonable delivery basis.

Send for a copy of the 220-page Van Keuren Catalog and Hand Book No. 35 containing valuable technical and engineering information on measuring problems and methods. Address: The Van Keuren Co., 175 Waltham St., Watertown, Mass.

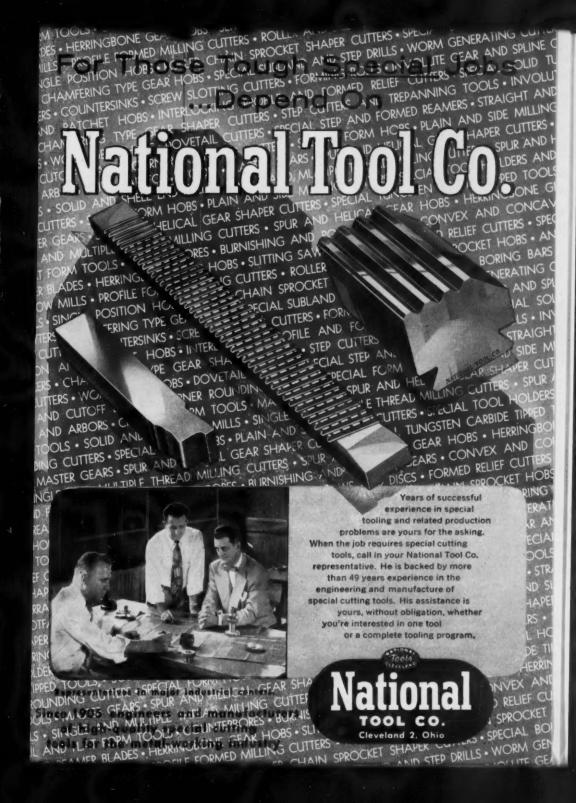


THE Van Keuren co.

175 WALTHAM STREET, WATERTOWN, MASS.

Light Wave Equipment \* Light Wave Micrometers \* Gage Blocks \* Taper Insort Plug Gages \* Wire Type Plug Gages \* Massuring Wires \* Intread Measuring Wires \* Gare Measuring System \* Shap Triangles \* Carbolay Camented Carbide Measuring Wires \* Gages \* Carbolay Camented Carbide Measuring Wires \* Orbana Carbida Taper Insert Plug Gages \*







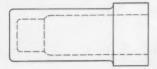
#### Swaging Success Stories

Shaping inside chamber...simplifies machining



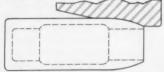


This finished piece with its specially shaped inside diameter presented a problem until Torrington's swaging experts were called in.





They suggested starting with this drilled, reamed and formed blank. Notice that the material at the open end is left oversize.





One swaging operation in dies designed for the job shaped the inside chamber as well as the outside to the desired contour.

#### Look at these Swaging Economies

- Swaging is fast—it is ideally suited to mass production of special shapes.
- 2. Swaging is easy—it can be performed by unskilled labor.
- 3. Swaging is efficient—it utilizes nearly all the material without waste.
- Swaging is inexpensive—it eliminates many costly screw machine operations, while giving metal better finish and resiliency.

For more information on swaging as a method for shaping or reducing metals, write for our informative booklet. It describes in detail the Torrington Rotary Swagers that may be able to help you write a "swaging success story" in your own plant.

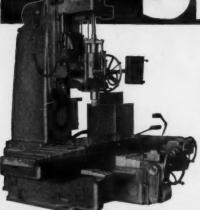


#### THE TORRINGTON COMPANY

Swager Department 730 North Street, Torrington, Conn. Makers of Torrington Needle Bearings

TORRINGTON SWAGING MACH





#### Featuring EXTREME ACCURACY

- THE NEW Electrolimit MEASURING SYSTEM locates the table fast, accurately and easily; holds wear to a minimum.
- EXCLUSIVE PRECISION PRELOADED BALL ROLL QUILL assures accuracy to "tenths" held indefinitely without maintenance or adjustment.

TABLE WORKING SURFACE 28" x 56"

#### Plus

#### ADDED PRODUCTIVITY



NEW P&W DOUBLE BIT BORING BAR for fast, accurate production boring. "Balanced Cut" removes up to 1/2" of tough alloy steel per revolution.

NEW P&W MILLING ADAPTER Screws directly onto spindle allowing precision face milling cuts with electronically controlled milling feeds.



This powerful, new machine is the latest addition to the famous P&W Electrolimit Jig Borer Line. With ample-capacity to handle a wide range of work sizes with speed, ease and efficiency. Send now for complete information.

| PRATT &         | WHITNEY         |
|-----------------|-----------------|
| DIVISION NILES- | BEMENT-POND CO. |

25 Charter Oak Blvd., WEST HARTFORD 1, CONN., U.S.A. Please send my free copy of 3E Bulletin No. 576.

| NAME        |      |        |
|-------------|------|--------|
| POSITION    |      |        |
| COMPANY     |      |        |
| CO. ADDRESS |      |        |
| CITY        | ZONE | STATE  |
|             |      | MMS-54 |





... plus 27½" grinding head stroke, 24¾" clearance over face plate, 42" diameter face plate—on Springfield's new Vertical Universal Grinder. The work piece on the grinder here is a washing machine agitator mold, 43" corner to corner. A tapered hole through it must match a conical male part (small illustration). One angle setting of the head ground both male and female taper for perfect fit. It had been planned to hand-lap them, a week's task. Springfield's time: 4½ hours.

Other Springfield Vertical Universal Grinders—swings 21" and 30". Lathes—toolroom, engine, contouring, reproducing—14" to 32". Write for name of nearest Springfield dealer.

BYTH YEAR OF BUILDING IDEAS INTO MACHINE TOOLS.





#### Three Epoch-Making New Yoder Developments

step up scope and economy of *Electric-weld* Tube Manufacture

1. For high-speed, low-cost production of tubing from aluminum, nickel, brass and other non-ferrous metals and alloys: Revolutionary new high-frequency electric induction mills for cold-forming and welding coiled strip into tubing, without drawing or heat treating. Welding speeds from 30 to 120 fpm.—almost as fast as electric-weld steel tube making. The lighter the gauge, the higher the speed and lower the cost, all the way down to .025".

2. New Induction-Weld Mill for making STEEL tubing up to 4" dia. and merchant pipe up to 2" dia. Speeds up to 250 fpm.—almost double that of resistance welding.

3. New 4-in-1 Resistance-Welding.

Transformer—actually four small transformers built into the most compact, efficient, trouble-free unit ever designed for tube welding. Insures highest daily production of quality tubes, with minimum scrap loss, All three developments are Yoder "Firsts"—making cold process tube manufacture more attractive than ever. For detailed information and literature, write, phone, or wire

THE YODER COMPANY-5532 Walworth Ave. · Cleveland, Ohio

#### Complete Production Lines

- \* COLD-ROLL-FORMING and auxiliary machinery
- \* GANG SLITTING LINES for Coils and Sheets
- \* PIPE and TUBE MILLS-cold forming and welding



#### RELAX! Hold to a tenth and Break Production Records

With the No. 5 Plain Grinding Machine you can conserve time, motion, and effort . . . consistently grind small parts to a tenth or less! Recessed design of base and convenient grouping of all controls permit operators to sit comfortably while maintaining top production. Automatic cycles reduce the operator's task to loading, start-

ing, and unloading. When equipped with **ELECTRALIGN**, alignment control to 0.0001" becomes simple and positive. For the complete story on the No. 5 — one of 18 outstanding Brown & Sharpe Grinding Machines — write for detailed Bulletin. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.





#### CUT COSTS WITH MULTIPLE BENDING

Whether you're bending pipes, tubes, reinforcing bars or structural shapes, you can greatly increase your bending production by multiple die bending.

Shown here is our Model A-5 BENDING MACHINE, tooled for bending 3 different radii without changing the set-up. In order to make multiple bending cost no more per die than single bending, individual dies are merely stacked on the die spindle and a shoe of the proper width permits the same degree to be bent without changing the automatic reset switch. The MODEL A-5

will bend pipe up to and including 2" standard weight pipe.

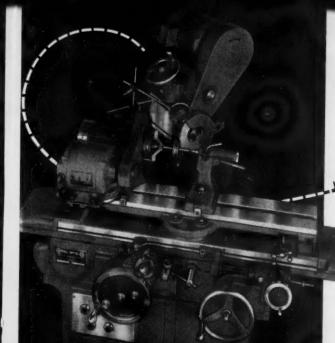
Redesigned and greatly improved, the Model A-5 still sells for only \$1975. F.O.B. factory, U.S. Funds.

Smaller and larger machines available.

Write for detailed and descriptive folder.

PEDRICK TOOL & MACHINE CO.

3640 N. Lawrence St. Dept. 5, Philadelphia 40, Pa., U.S.A.



#### COVEL NO. 12 UNIVERSAL CUTTER AND TOOL GRINDER

This versatile machine can get production off to a flying start - and keep pace with a steady flow of precision-ground, highly efficient tools.

Typical of No. 12's universal scope is this form grinding attachment set-up for grinding circular form tools. It embodies fine longitudinal feed-fine cross feed: for the extreme accuracy necessary for both longitudinal and transverse movement.

#### Write for

12-page detailed Bulletin M-94

#### PRODUCTION Starts IN THE TOOL ROOM

Look to your tool room - where production starts — and see whether your tool-makers and set-up men are hampered by obsolete, inaccurate and wasteful grinding equipment. Poorly ground tools and cutters handicap production every step of the way - through inferior results, costly rejects, loss of valuable time, expensive tool waste.

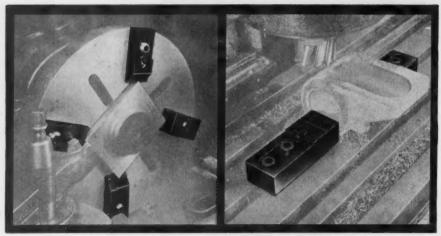
If your cutter and tool costs are high, perhaps you are paying for Covel quality without enjoying its many profit-saving advantages . . . and if so, now is the time to call on Covel for the answer. We will be pleased to send complete information.

continuous manufacturing experience makes your COVEL

choice a sound one

OVEL PRECISION GRINDERS

DRILL GRINDERS - UNIVERSAL CUTTER & TOOL GRINDERS - HYDRAULIC & HAND FEED SURFACE GRINDERS



I & S "ALL-PURPOSE" JAW CLAMPS CAN BE USED ON ALL STANDARD TYPES OF MILLING MACHINES. LATHES, PLANERS, BORING MILLERS, DRILL PRESSES, AND OTHER MACHINE TOOLS

#### How to secure workpieces with ease, cut handling time up to 75%

J & S "All-Purpose" Jaw Clamps give you many unusual advantages in securing workpieces to machine tools -- save as much as 75% of the time required with outdated methods.

#### **Downholding Principle**

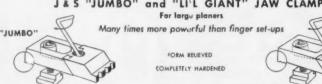
J&S' downholding principle makes this possible. Here's how it works: When you turn the adjusting screw of the clamp, the jaw travels straight in and down. This forces the workpiece horizontally against the opposite clamp and downward against the face plate or table. In this way, centering is quick, simple. The tapered slot prevents the clamp from slipping regardless of the load.

#### Need no U-clamps or straps

With J & S "All-Purpose" Jaw Clamps, you can avoid the use of U-clamps and straps, disregard different length studs and blocking. You can also minimize obstructions in set-ups, reduce cut-off waste. You can pass over J & S Jaw Clamps 1" from the working surface of the machine face. The whole surface of the workpiece can be machined to within %" of the face

You can get J & S "All-Purpose" Jaw Clamps in a variety of sizes Write for complete information today

#### J&S "JUMBO" and "LI'L GIANT" JAW CLAMPS



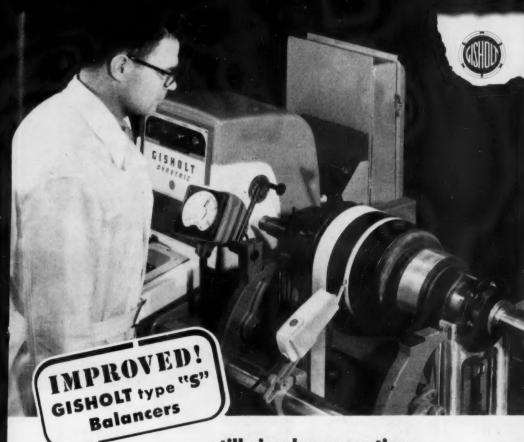
Both clamps have T-nuts which fit all large standard planers. 45° oblique travel of jaw secures workpiece against table and against counterthrust of opposite clamp. 1/16" back taper (dotted line) and relieved ground surface (magnified detail) prevent slippage



WHEEL DRESSERS - JAW CLAMFS PRECISION VISES - SINE BARS - DOWN-HOLDING DEVICES

645 W. MT. PLEASANT AVENUE, LIVINGSTON, NEW JERSEY

'LI'L GIANT"



#### still simpler operation with fewer controls...easier readings

Yes, we've made it possible for you to handle all balancing faster and easier than ever before.

On these improved Type "S" Balancing Machines you have but two operating controls, one for indication of amount and location of required correction in each plane. Amount and location of correction are shown simultaneously—on a uniformly graduated scale with large, easy-reading pointer and dial.

These are a few of the new features which years of broad production and maintenance experience have proved desirable. And Gisholt, always first in balancing, is first again to bring you new standards of performance.

The improved DYNETRIC Type "S" Balancing Machines are offered in both horizontal and vertical models; capable of balancing workpieces ranging from a few ounces to several hundred pounds.

Why not get complete details?

#### G SMACHINE COMPANY

Madison 10, Wisconsin





At Danly's Chicago Plant. final broaching to assure accurate sizing and parallelism of guide post and bushing holes

World's fastest die set service speeds up your tooling program



DANLY MACHINE SPECIALTIES, INC. 2100 South Laramie Avenue





ready for assembly to your order

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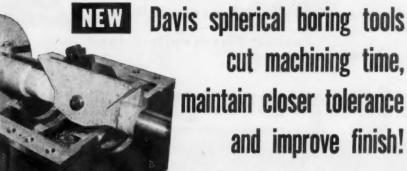
FAST, NATIONWIDE DELIVERY FROM THESE BRANCHES

Danly's new, faster service starts at the main Danly Plant in Chicago where two unique, high-speed, mass production lines are devoted exclusively to the manufacture of interchangeable, precision die set parts. Stocked by Danly Branch Plants in major toolmaking centers, these interchangeable parts are quickly assembled to make up the size and type of die set you need-and delivered to you only a few days after your order is received. Make a note right now of the Danly Branch nearest you from the list given on this page. Next time you need die sets, give your Danly Branch a call. See how they can meet your needs from stock ... and save you time with fast, local service.

"LOS AMGELES 54 Ducommun Metals & Supply Co. 4890 South Alameda MILWAUKEE 2 111 East Wisconsin Avenue PHILADELPHIA 40 511 W. Courtland Street TROCHESTER 6

33 Rutter Street <sup>9</sup>Indicates complete stock

#### If there's a better way to bore - Davis does it!



These Davis spherical boring tools, mounted on a continuous feed facing head, are currently being used in machining 9" to 48" bearing seats of pedestals and caps. As reported by a large electrical equipment manufacturer, the new tool has considerably reduced tool breakage. What's more, it maintains closer tolerances and produces a better finish than was previously possi-

ble. If you've a spherical boring problem, chances are one of the three types of Davis special tools shown below is the answer.

#### 3 exceptionally flexible ranges — 8 to 48" diameters

FOR LARGER WORK — 24 to 48"

Simultaneous tool rotation and spindle advance produce spherical motion of block-type cutter.



FOR MEDIUM BORES - 8 to 12"

Relative motion of outer to inner bar moves cutter spherically.



SMALLER DIAMETERS - 8 to 13"

Adjustable stop collar positions cutter for spherical boring.



REMEMBER . . . if Davis can't bore it — it can't be done! Send for Catalog 304 illustrating complete line of Davis boring and cutting tools.

#### DAVIS BORING TOOL DIVISION

OF GIDDINGS & LEWIS MACHINE TOOL COMPANY
FOND DU LAC, WISCONSIN



#### a cost cut with every stroke...





#### shaper.planers



#### an exclusive design for efficient production...

The Shaper-Planer is the only production machine tool manufactured exclusively for work which is too large for a shaper... and too small for economical production on a planer.

It features versatility and high cutting speeds, combined with

hydraulic drive and feeds, in a price class that is hard to equal even by smaller, less flexible machines.

For planing and shaping efficiency in this class of work, get the complete story from your Rockford Machine Tool Co., representative, or write us direct for Bulletin 802.

Available in Openside, Double-Housing and Triple-Circuit Models



ROCKFORD MACHINE TOOL CO.

2500 KISHWAUKEE STREET . ROCKFORD, ILLINOIS



#### by the builders of the famous

Built-in characteristics of STANDARD Spindles:

- · Built for Longer Life
- Precision Tolerances
- Extra Heavy Duty Why settle for less?

Write for details today. SEE US IN BOOTH 1028, METAL SHOW, CHICAGO, NOV. 1-5.

Standardize with

PRECISION SPINDLES . MACHINE TOOLS

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Prove it to yourself right in your own plant...



#### MID-WEST WHEELS CUT SURFACE GRINDING COSTS!

S11A Mid-West cool cutting wheels have been tested in the tool rooms of our customers all over the country. Results: operating costs were cut, while grinding efficiency was increased!

The reasons are simple. First, because of the quality of materials used. Made with a sharper, harder Aluminum Oxide grain in a glassy vitrified bond, Mid-West wheels offer top grinding results; yet you save on costs. Second, because each Mid-West cool cutting wheel is made for a specific tool room application. Using the right wheel for the right job not only increases grinding efficiency, but speeds up your production time. Your results are bound to be better! See for yourself...right in your own plant!

For complete information regarding Mid-West cool cutting grinding wheels, write, wire or phone today.

D-WEST ABRASIVE CO.

Executive Offices: 510 So. Washington St., Owosso, Mich., Factories: Owosso, Mich., Rochester, Pa.



#### BRYANT THREAD GAGE

This internal thread gage gives a fast, accurate check of accumulated errors in P.D., form and lead with a single reading of the dial indicator. A pair of segments, one movable, quickly engage the mating part.

Interchangeable pairs of segments inspect all classes of threads from 1/16\* to 5" diameter. Write for descriptive literature on this and other Bryant gages.

Bryant Chucking Grinder Co., Springfield, Vermont, U.S.A.

#### NOW IS THE TIME TO PLAN AHEAD



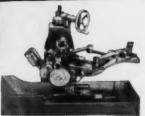
No. 2 MOORE JIG BORER, with its accurate lead screw settings within .0001", offers all the time-proven precision features associated with Moore Jig Borer construction for 15 years, plus numerous labor-saving advantages, including: increased capacity and size; infinitely variable spindle speeds; 3 power feed ratios; centralized controls.

No. 2 MOORE JIG GRINDER. With this new and larger Moore Jig Grinder, regular and irregular contours are ground to size and location after hardening. This extends the Jig Grinder's traditional function of relocating straight and tapered holes. Holes from 1/64" to 8" can be relocated and ground within .0001"—by power or hand feed.





Four ways to cut costs and meet competition by mechanizing your toolroom.



MOORE PANTO-CRUSH WHEEL DRESSER speeds form-grinding and cuts costs. Both crush-forming and diamond-dressing are accomplished with this 2-in-1 unit permanently mounted on the wheel spindle of a surface grinder. You switch from one method to the other without disturbing workpiece setting.

We'll be glad to send you complete descriptive literature on any of these machines.

MOORE SPECIAL TOOL COMPANY, INC.

730 Union Avenue, Bridgeport 7, Conn.

#### ADD (TOUR TOOLROOM

Jig Borars . Jig Grinders . Panto-Crush Wheel Dressers . Die Flippers . Motorized Centers . Hole Location Accessories

No. 1 MOORE JIG SORER remains in the line. For its range-

table working surface of 10" by 16" and cuts up to 31/4"

-this machine is still an ideal buy. There are over 1300 satisfied users. We will continue to offer it for the many

situations where a small, accurate jig borer fills the re-

quired prescription.

#### STEP-UP Your Light Precision Machining with LIGHT TEN LATHES

Here is a whole series of small lathes designed and built to do your light precision machining. All have the same sturdy construction, the same convenience and ease of operation. Send for complete catalog and select the lathe which exactly suits your needs.

#### SPECIFICATIONS

Swing — 10" over bed
Collet Capacity — 5%" max.
Spindle Bore — 27/32"
Distances Between Centers
161/8" to 341/8" max.
Spindle Speeds (approx.)
12-speed drives — 48 to
1435 r.p.m.
16-speed drives — 52 to
1365 r.p.m.

Power Longitudinal Feeds Toolroom and Model A — 48, .0015" to .0853". Model B — 26, .0021" to .0155". Model C — 14, .0021" to .0156".

Power Cross Feeds Toolroom and Model A — 48, .0004" to .0255". Model B — 23, .0009" to .0046". Model C — manual



Light Ten Floor Lathe - Model A Base Price \$786



Light Ten Toolroom Precision Bench Lathe Base Price \$731



Light Ten Bench Lathe - Model A Base Price \$500



Light Ten Bench Lathe — Model B Base Price \$424



Light Ten Bench Lathe - Model C Base Price \$354

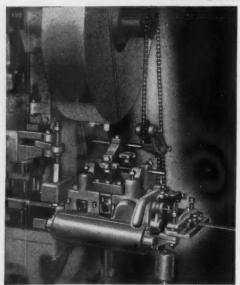
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IT'S EASY WITH WITTEK

**Automatic Roll Feeds** 



Step up production by making your punch presses automatic! Wittek automatic roll feeds fit all makes and sizes of punch presses — provide maximum efficiency and extreme accuracy in the high-speed automatic feeding of strip stock. They are made in single roll, double roll, and compound types with straighteners, in models to feed (push or pull) in any of four directions. Length of feed is quickly and

easily adjusted to meet individual job requirements.

#### WITTEK Reel Stands Simplify Handling of Coiled Stock

A choice of standard models is available to facilitate handling a large variety of coiled stock...from small, light coils to those weighing up to 800 pounds. These larger reel stands automatically center the coils and provide frictional braking action to prevent overrunning and maintain uniform coil slack.

Write for full particulars

WITTEK Manufacturing Co.

4322 W. 24th Place, Chicago 23, Illinois





### REDUCE INSPECTION COSTS...

#### with Flame-Plated plug and ring gages

Steel Gages Flame-Plated with tungsten carbide:

- ★ Outwear chrome-plated gages 20-1
- ★ Outwear solid carbide gages 3-1
- ★ Have the same thermal expansion as gage base metal
- \* Are highly resistant to chipping and breaking

Cut inspection costs without sacrificing accuracy. Flame-Plated plug gages are available from leading gage suppliers in standard AGD sizes from .059 up . . . ring gages from .240 up.

Flame-Plating is a LINDE process for depositing a coating of tungsten carbide to parts and many tools. For the full Flame-Plating story, call your nearest LINDE office or send for your free copy of the new Flame-Plating booklet.





The term "Linde" is a registered trademark of Union Carbide and Carbon Corporation.

#### LINDE AIR PRODUCTS COMPANY

A Division of Union Carbide and Carbon Corporation 30 East 42nd Street TT New York 17, N.Y.

Offices in Principal Cities
In Canada: DOMINION OXYGEN COMPANY
Division of Union Carbide Canada Limited, Toronto



# has a meaning all its own **Every little spark stream**

Upper photo, HIGH CARBON STEEL . . . lower left, TITANIUM . . . lower right, HI-SPEED STEEL.

Touch a grinding wheel to a bar or billet, and a trained spark-tester can tell you what the metal is—even what the alloy is—by observing the spark pattern. Many companies use this method to double check the metals used in manufacture. It is one

thing to choose a grinding wheel for spark testing—quite another to choose one for production grinding. The spark stream from your grinding machine tells a different story—a profit story—when you use grinding wheels by CARBORUNDUM. Profitable

grinding is possible only with the wheel that suits your production demands, your machine, your operator. Making *sure* you get the right wheel for every purpose is a cardinal rule at CARBORUNDUM. For proof, call your Distributor or Salesman today.

Through application "know-how" and product quality

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REGISTERED TRADE MARK

continually puts more sense in your abrasive dollar

#### Cut Production Costs: send for these

#### FREE KLING BULLETINS

For over sixty years Kling machines have been helping fabricate metals easier, faster and at lower cost. That is why more and more leading companies in every industry are equipping with Kling machines. Here are some of these machines and the jobs they can do for you:

Free Bulletin No. 9200 Tells How

#### KLING HIGH-SPEED FRICTION SAWS

. . . enable you to do the job faster

Less time required for cutting beams, channels, rails, angles, squares, rounds or tubes. No set-up changes needed to cut any sequence of structural shapes. Takes place of several separate shears or other type saws. Cut alloy steels, too, in record time!

Free Bulletin No. 2345 Describes

#### KLING DOUBLE ANGLE SHEARS

... 2 Shears in 1 machine

This high-production machine can give you more and cleaner cuts on many different shearing operations. For instance you can simultaneously shear round bars and bar angles on left side and structural angles and flat bars on the right. Automatic holddowns as well as automatic lubrication are available.

Free Bulletin No. 600 Shows How

#### KLING ANGLE ROLLS

. . . cut your costs on structural shapes

If you use beams, angles, tees, bars, channels, rails or other structural shapes or reinforcements, see how you can save money "rolling your own" with Kling Angle Bending Rolls. Kling offers the widest selection of rolls of all kinds, both angle and plate.

Free Bulletin No. 347 Tells How

#### KLING COMBINATION SHEAR, PUNCH AND COPER

... does the work of many machines

One of these Kling Machines can turn out the work of a separate punch, angle shear, bar shear, plate shear and notcher—yet it costs little more than a single-purpose punch.

Send today for the bulletins in which you are interested.

Makers of Friction Saws, Double Angle Shears, Rotary Shears, Punches, Angle Bending Rolls, Plate Bending Rolls and Combination Machines found in the "Best of Companies".

706MM



KLING BROS. ENGINEERING WORKS 1320 N. Kostner Ave., Chicago 51, III. Export Distributor:

Simmons Machine Tool Corporation, 50 East 42nd Street, New York 17, N. Y. Microbore ...

"The Multi-Purpose Single Point Adjustable

For Precision Be Turning and facing

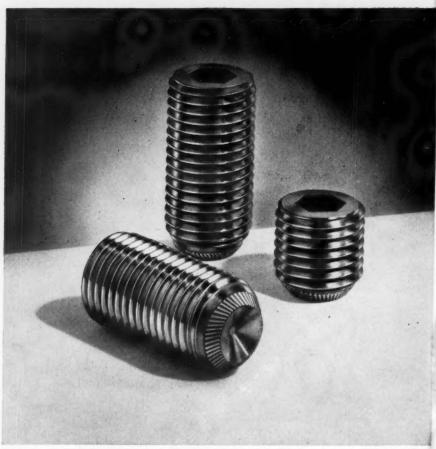
Production Applications: A complete service is available for engineering and manufacturing Microbore Equipment for production operations.

General Purpose Work: A wide range of Standard Microbore Boring Bar Sets is available for Tool Work and general purpose boring.

For the latest developments

in precision tooling consult DE VLIEG of DETRO

DEVLIEG MICROBORE CO. 480 Fair Avenue . Ferndale 20, Michigan, U.S.A.



UNBRAKO SELF-LOCKING SOCKET SET SCREWS feature the following advantages: knurled cup point that won't work loose; accurate hex socket for nonslip,

positive drive; fully formed threads—Class 3 fit; heat treated alloy steel for strength; standard sizes -#4 to 1"—in a full range of lengths.



USE UNBRAKO.s wherever ordinary cup point set screws are used. On radios, television sets and electronic equipment.



On refrigerators, washing machines, and other household appliances.

#### 9 times out of 10 a standard UNBRAKO will do the job

A special socket screw may not be necessary, a standard Unbrako usually does the same job—much cheaper. Your local industrial distributor stocks Standards. He gives immediate attention to your requirements, and such extras as special delivery to your plant. Write for Unbrako Standards. Standard Pressed Steel Co., Jenkintown 22, Pa.



SOCKET SCREW DIVISION





On power mowers, power saws and other power tools.



UNBRAKO Standards—as listed in the SPS Catalog—are stocked by leading industrial distributors everywhere.



## Star Quality

Costs No More

why not get these

#### SAFE, UNBREAKABLE

high speed blades from your STAR Distributor?

For over 75 years, industry has known STAR Hand and Power Hacksaw Blades as quality blades.

Here, as an example, is the STAR Unbreakable High Speed Steel Blade—safe, fast-cutting, long-lived. The STAR combination of a flexible steel back, special-process weld and high speed steel cutting edge adds up to an efficient, shatterproof, proved-quality blade.

#### STAR SERVICE COSTS NO MORE

Order any of the complete line of STAR Blades from your Industrial Distributor—your best source of supply for hundreds of the items you need to operate efficiently, economically, and without production interruptions.

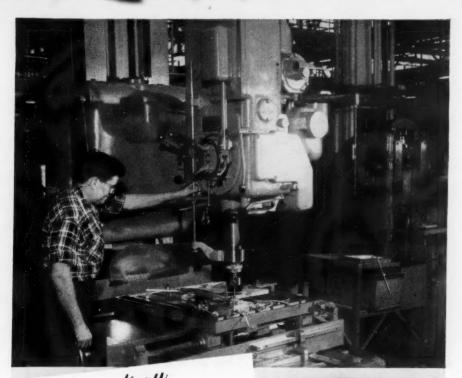
Sold Only Through Recognized Distributors



#### CLEMSON BROS., Inc.

Makers of Hand and Power Hack Saw Blades, Frames, Metal Cutting Band Saws and Clemson Hand and Power Lawn Machines.





FOR QUALITY



Top Quality in your product demands that interchangeable parts be fabricated to the highest degree of accuracy. To obtain such necessary tolerances requires the selection of machines recognized as meeting such high standards. The Bullard Spacer, without the high cost of jigs or fixtures, gives the San Diego Division of Convair, on drilling and counterboring, tolerances up to +.0015 and --.0000, and distance between hole centers within ±.005. On other installations also, with precision drill spindles, The Bullard Spacer holds consistantly to ±.004 and sometimes closer.

Let a Bullard Representative analyse what this machine can do on your work or write to





# JIG GRINDING ACCURACY guaranteed\*

#### **EASILY CONNECT**

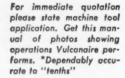
this jig grinder to jig borer or mill (The "Vulcanaire" has infinite controlled speeds 30,000 to 65,000 R. P. M.)

Then you can finish grind in hardened steel to "tenths"...
jig grind dowel holes square with a ground base... move
location of holes in hardened steel blocks... jig grind interchangeable holes in hardened sections... grind small holes
with diamond impregnated mandrels... grind contours and
relief with tungsten carbide burrs... grind radii in die
sections... eliminate jig bushings in tools where close spacing
is essential.

#### Other infinitely controlled air driven spindle applications

Place spindle on most any machine. Use it for finishing contours on hardened steel working surfaces . . . burring or milling die castings . . . routing wood contours . . . carbide milling or finishing slots . . . finishing holes in hardened steel to "tenths" . . . grinding with diamond wheels, carbide burrs, or diamond impregnated mandrels.

Advantages—10 micro finishes using carbide mills . . . 6 micro finishes using mounted points, operates at any angle . . . air driven, air cooled, overheating prevented . . . speed controlled at optimum point . . . 35%" long motor uses little working space . . . By controlling speed at any point you abolish need for many constant speed spindles.





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Engineering, Processing, Designing and Building, Special Tools, Dies, Special Machines including the Vulcan Hydraulics that Form, Pierce, Assemble and Size.

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#### HOW SMALL PINES Hydraulic BENDERS SPEED OUTPUT of TV SERVETTE TRAYS

At Quaker Stretcher Co., Kenosha, Wis., four Pines Series 1400 Benders are producing high quality bends for TV servette tray legs at unusually low cost. Two smooth, 90° bends on a 2" CLR are formed in 5/8" x .018" wall, roller-coated, lock-seam tubing without marring the black enamel finish. The machines, costing under \$2000.00 each, are operated by women. High efficiency is maintained. Net production per machine averages 432 bends per bour, and the only scrap loss is a very few pieces while making setups. Pines Series 1400 Benders feature small capital investment, fast, easy operation, and uniform results. Hydraulic actuation assures dependable accuracy, low operating cost.



PRODUCTION BENDING . DEBURBING . CHAMPERING MACHINERY



Closeup showing easy-operating manual toggles, simple tooling. Plug mandrel, Ampco bronze wiper die produce smooth, mar-free bends in pre-coated stock.



Write for free copies of "Pines News" illustrating latest cost-cutting bending techniques. Or, call on Pines Engineers for assistance on any job.





When it came to high-volume, low-cost production of its famous Speed Nuts, Tinnerman Products, Inc., turned to Bliss High Production presses. That is because Bliss HP presses provide definite operating advantages, especially on

**Behind** 

high-speed, progressive die operations. Here's how the Bliss design cuts vibration and deflection to a minimum; maintains high output and long die life:

- Crankshaft with oversize crankpins supported in heavy box-type crown
- Frame of high-tensile, fine-grained Meehanite with heavy sections minimizing deflection
- · Slide guided in bronze-lined square gibs throughout entire stroke and adjustment. Gibs are aligned to extremely close tolerances for very accurate slide guidance
- · Rolls and feed adjustments built-in for precision feeding
- · Compact design for high-speed operation
- · Die area easily accessible from both front and

rear of press for ease in setting complicated multiple-station dies.

**Bliss Presses** 

If your metal stampings involve high-volume production and/or progressive die operationsyou will find it worth your while to investigate Bliss HP presses. Let a Bliss sales engineer tell you about the large range of sizes, the full significance of these design features. Write for catalog.

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. ARE THE BEST BUY!



Eclipse Radial Drive High Speed Steel Cutter bores 5 diameters in steel part.



Special Cutter forms ball seat in road building machinery unit.

> Tungsten Carbide Tipped Cutter precision bores three diameters in aluminum gear case.

Radial Drive Tungsten Carbide Tipped Cutter bores gear pocket in oil pump.

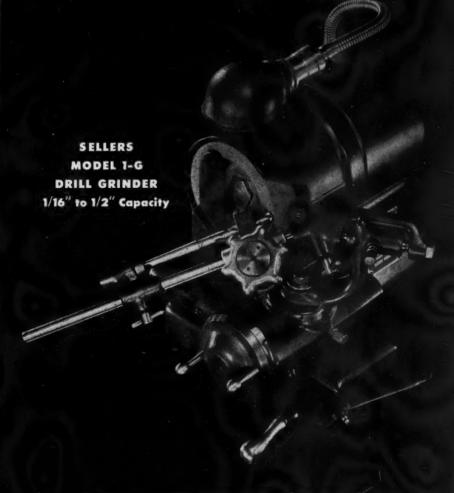


Multi-diameter cutter with Tungsten Carbide Tipped inserted blades for boring, counterboring and chamfering.

Since 1913—through two wars and during the peace years—Eclipse has met the exacting and changing demands of industry for special purpose end cutting tools. What better test? What better recommendation? Our large modern plant can serve you, too. Send your problem to us, today!

DETROIT 20 MICHIGAN

106



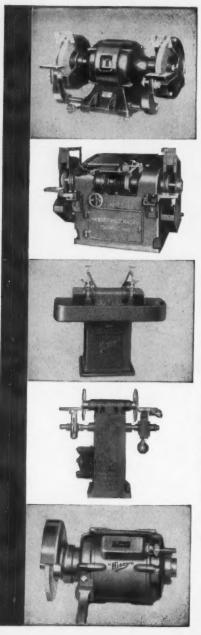
Nothing will do so much to reduce your drilling cost for so small an investment as a Sellers Drill Grinder!



## CONSOLIDATED

WHOLLY OWNED SUBSIDIARY OF FARREL-BIRMINGHAM COMPANY, INCORPORATED

ROCHESTER, NEW YORK



#### ... and the moral of the story is

. . . you've got to have the right tools and equipment to do the job.

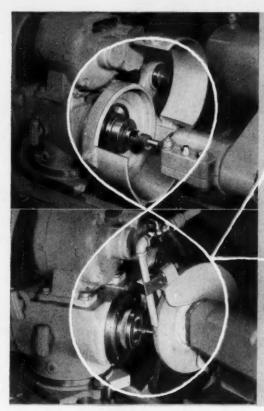
If the job involves grinding or buffing, the chances are that one of the 247 different types and sizes of HISEY machines will more than fulfill your requirements.

Included are Drill Grinders, Disc Grinders, Wet Tool Grinders, Bench and Pedestal Buffers for endless sharpening, snagging, finishing and fitting operations.

From the first line on the drawing board to the finishing touch in the shop-we design and build HISEY Grinders and Buffers to give long, trouble-free service. HISEY is the operators favorite . . . because they're designed to his convenience . . . built to increase his efficiency. They're competitively priced . . . the logical choice of both large and small shops.

Write for catalog 72 MN today!







# EXTERNAL GRINDER



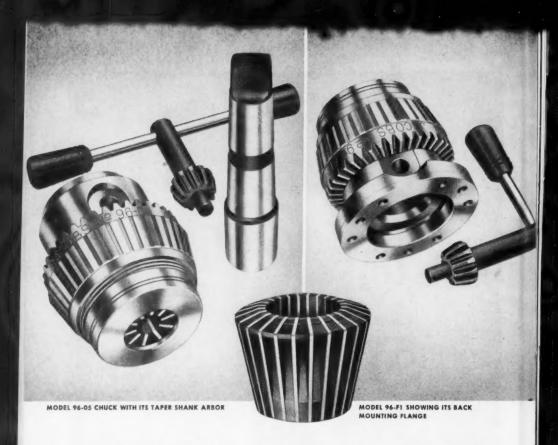
This small hole grinder mounts interchangeable wheelheads for internal and external spindles. Hole capacity is 3" dia. with a maximum depth of 4"; external is to 3" dia. by a 4" length. Collets and step chucks mount directly in lathe-type spindle.

This flexibility combined with the inherent accuracy is why the Rivett 84 has gained great popularity in toolrooms since its introduction to the trade twelve months ago.

Quick and easy to set up, the 84 will handle your diversified jobs faster, too. All the details to prove this are shown in Catalog No. 84-A. Write for a copy today!



RIVETT LATHE & GRINDER, INC., DEPT. MMR9, BRIGHTON 35, BOSTON, MASS.



#### NOW! New Jacobs Model 96 Rubber-Flex Collet Chuck

#### brings famous grip to whole new group of applications

Grinders! Milling machines! Jig borers! Jig grinders! Lathes! Various types of special machinery where precise compact collet closure is vital!

ALL get the benefit of the famous Jacobs Rubber-Flex Collet grip in the new Jacobs Model 96 Collet Chuck.

The long, steel jaws of this collet — locked together with oil-resistant synthetic rubber — provide an absolutely parallel grip over the entire bearing surface.

What's more, each collet has a full \( \lambda'' \) range so that the standard set of eleven Rubber-Flex Collets cover the gripping range of eighty-eight split steel collets! A geared key tightening device and self-tightening toggle action of the collet jaws give the chuck gripping power far beyond that obtained with split steel collets. Chucks any diameter bar between \( \lambda\_b'' \) and 1\( \lambda'' \)

For work holding: Model 96 Collet Chuck permits precision chucking of bright finished bars, with close or wide tolerance diameters, resilient or compressible materials, tubing and brittle materials such as ceramics or glass.

For tool holding: Model 96 Collet Chuck can be used for drilling and reaming on jig borers and other high precision machines, holding proving bars and indicators. Extreme accuracy and wide capacity range make it ideal for tool and cutter grinding on cylindrical and cutter grinders.

TWO MODELS: Model 96-05, \$135.00; Model 96-F1, \$150.00, Rubber-Flex Collets, \$12.00 each.

For further details, ask your Industrial Supply Distributor for Catalog 54-CC. The Jacobs Manufacturing Company, C West Hartford 10, Conn.

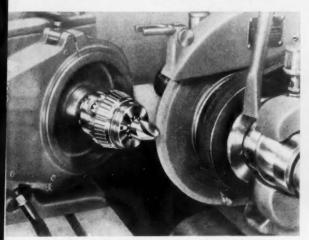




PRECISION REAMING ON JIG BORER with Model 96-05.



NEW JACOBS MODEL 96-F1 COLLET CHUCK on magnetic chuck holds work for surface grinder.



MODEL 96-05 ADAPTED TO HEADSTOCK OF CYLINDRICAL GRINDER.



NEW CHUCK Model 96-F1 her holds work on jig grinder.



PRECISION BUSHING GRINDING with Model 96-05.



CHUCKING WORK ON VERTICAL MILLING MACHINE with Model 96-F1.

IF IT'S A

## **JACOBS**

IT HOLDS

#### Jacobs and your local distributor

are ready to deliver the chucks you need and the service you deserve.

- ... first in chucks
- ... first in service



The new Sonnet Helicarb Milling Cutters combine the edge hardness of one-piece carbide tips with the proven principle of a true helix flute design. Result? A rugged, heavy duty cutter unmatched for stock removal and efficiency!

The constant included cutting angle of the "Helicarb" cutter distributes the cutting load uniformly over the full length of the cutting edge. Under proper conditions, this unique shearing cutting action reduces impact and gives 3 to 10 times greater production than possible with helical flute high speed steel, or straight tooth, carbide-tipped cutters. Uniform chip load and proper chip flow result in longer cutter and carbide life, less chatter, minimum chip recutting and smoother finishes - 20 rms and better on actual production jobs!

Proof of "Helicarb" efficiency! A 3" "Helicarb" straight shank end mill on a 50 h.p. mill removed 611/2 cubic inches of 2340 nickel alloy steel (Rockwell C28) per minute! Spindle speed 416 r.p.m.; table speed 19" per minute; cut depth 1-5/32".

Ask your authorized industrial distributor for prices and sizes.





Shell-End Mills

HELICAR

HELICAL CARBIDE MILLING CUTTERS

Sonnet Tool and Mfg. Co., 576 No. Prairie Avenue, Hawthorne, California



# WISCONSIN Multiple DRILL HEADS Adjustable

Adjustable Spindle Heads have Dual Positioning Plates for fast, accurate set-ups that "stay put".

Positioning and Locking Templates are furnished for each bolt circle or hole pattern . . . to your exact specifications.

Half-hole Positioning Plates (1) make it easy to swing spindles into place quickly. Locking Plates (2), with full holes, are mounted on support posts to lock set-ups securely against shifting.

6 Capacity Ranges . . . from "Light Duty" to "Extra Heavy Duty". Standard Models have 2 to 8 spindles. Special Models built to order.

# Adjustable and Fixed-Spindle Types

1. Half-hole Positioning Plate.

**2.** Locking Plate has full holes to hold spindles in place.

Send print of Hole Pattern for estimate.

WISCONSIN DRILL HEAD CO.

BUTLER, WISCONSIN

A 5942-1P September, 1954 the De Laval Separator Company.

OF POUGHKEEPSIE NEW YORK

50 CM

emphasizes TWO IMPORTANT POINTS

about their several

# **SIDNEY** LATHES

"It has an extremely solid construction which gives a good finish so that very little polishing is necessary."

2.
"It has been accepted by our operator and personnel within the department as a machine of clean, rugged design."

### SIDNEY LATHES

PROVE THEIR
SUPERB PERFORMANCE
IN YOUR PLANT

MORE WORK PER HOUR ..

LOWER COST PER HOUR THE DELAVAL SEPARATOR COMPANY USES

#### SIDNEY FLUID TRACER LATHES

to make form punches and dies ... with the satisfactory results mentioned in their comments. All Sidney Lathes are designed throughout to provide unusual strength which insures long life and years of satisfactory performance.

Write for Bulletins

THE SIDNEY MACHINE TOOL CO. . SIDNEY, OHIO

Builders of Precision Machinery since 1904

#### SALES and ENGINEERING SERVICE IS NEAR YOU!



There is a thoroughly qualified CLEEREMAN representative in your vicinity. Take advantage of his "know how." A study of your work may prove that the installation of CLEEREMAN equipment in your plant is the answer to your high cost and low profit problems.

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| Vancouver | Rudel | Machinery | Company, | Limited |

#### CLEEREMAN MACHINE TOOL CO. . GREEN BAY, WISCONSIN

# CLEEREMAN

#### DRILLING

A battery of box column and round column Cleereman Drilling Machines on production work. One of many such installations producing at lower costs with higher production, less operator fatigue and no down time.



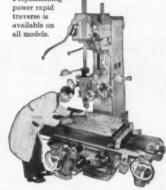


#### LAYOUT DRILLING MACHINE

A modern solution to an old problem. Built for those tool room and manufacturing jobs which do not require the ultra precision of Cleereman Layout Machine is an economical machine capable of locating within .001° per foot and drilling, boring, reaming, tapping, etc., with utmost operator ease at a fast rate of production.

#### JIG BORER

Unexcelled precision for ultra-fine tolerances on highest quality gage, tool, die, jig and fixture work and on "jigless" production. Combines stamina with precision and ease of operation. Prepositioning power rapid

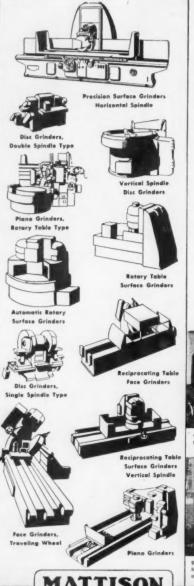




AFFILIATED WITH

CLEEREMAN MACHINE TOOL CO. Green Bay, Wisconsin

BUILDERS OF PRECISION JIG BORERS AND DRILLING MACHINES



# MATTISON Grinders

#### If its a Flat Surface to Grind There's a Mattison to Grind it.

● With the addition of the production grinding machinery formerly made by the Hanchett Manufacturing Company, Mattison now is in a position to work with you on all your surface, face and disc grinding problems. These machines are made in various types to handle a wide range of work. Experienced fixture engineers are available to give you best production efficiency with Mattison Machines.

For any flat grinding, ask for our recommendations on the proper method and machine for your job. No obligation, of course.

For catalog on all machines, ask for free copy of general bulletin.



40 hours before — now 4 hours. Pump case ground on Mattison Horizontal Spindle Pre-



320 surfaces of cast iron compression heads per hour, removing 1/32" stock with Mattison



900 connecting rods per hour, using 40 station fixture to finish grind crank and wrist pin ond of assembled rod with Mattiann No. 72 German.



Shows variety of work run on Matteen Face Grinders

MACHINE WORKS

ROCKFORD - ILLINOIS

#### WHY IT PAYS TO BUY STAINLESS BARS FROM US



 Most manufacturers find the cost of maintaining and handling large stocks of stainless steel is highly impractical. And it's certainly not necessary. For at any U. S. Steel Supply warehouse you always have the widest selection of types, grades and sizes of stainless—top quality, dependable USS Stainless Steel—within easy access.

Why not let us carry your inventory? Our larger stocks mean quick and easy procurement... and greater

flexibility in design.

In addition, our experienced stainless men will gladly help you with your stainless design problems. They make certain that you always get the best grade for

the job

Next time you want the finest in stainless steel and in service, call the nearest U. S. Steel Supply warehouse. We carry USS Stainless Steel bars—rounds, squares, hexagons, flats, angles, channels—and USS Stainless sheets and strip.

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UNITED STATES STEEL

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#### over the editor's desk

#### Of Benefit to All

TO those who look upon the matter of high prices as they do the weather, that nothing can be done about it anyway, we have some reassuring news. One company, South Bend Lathe Works, recently decided to publicize its own experience which shows that prices of machine tools and related equipment have not risen nearly as fast nor as high as have wages and materials during the past thirteen years. The following letter explains the thinking behind the action to do something to combat the criticism of prices:

#### Dear Sir:

Although your business is entirely different from ours, we undoubtedly have a common problem—criticism of prices.

Purchasers and prospects who voice this objection make a comparison of current prices with those of a number of years back. What they do not consider is the way costs have risen in this period. If they did, it would be evident that to-day's prices are justified.

We feel that this type of thinking is the cause of resistance that should be corrected in many fields. In order to do something about it in our own particular case, we are calling attention to the facts in our trade paper advertising through the use of the following graph:



Here you will see that our wages have climbed 150% since 1941, materials 131%, and prices only 49%. Since conditions do not forecast any declines in labor or material costs, these figures indicate the lack of cause for price criticism and the fallacy of delaying purchases in the hope of decreases in machine tool prices.

Many industrial manufacturers have been unfairly censured because of their prices and we feel that if more of us would bring the real facts out into the open that we would all benefit.

#### SOUTH BEND LATHE WORKS

N. D. Jackman

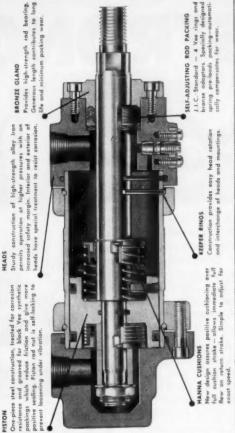
# mpletely New in DESIGN and ENGINEERING



# CYLINDERS

We didn't design these cylinders with a "new look" in mind — although they have it. What's most important to you is their new performance... new operating features... new versatility. The cross-section points out just some of the new features. Others are, ground, polished, chrome-plated rods of alloy steel; cold drawn brass cylinder tubes; cushion adjustment dials; large fluid passages; and J.I.C. Standard leak-proof "O" may paskete.

You will like the greater power developed from dimensionally smaller units in the Hanna "750"



Fluid Power line. Because of their broad capacity range, air up to 250 psi and hydraulic up to 750 psi, you'll be sure of smooth, dependable and lasting operation in the medium pressure ranges.

Inside and outside, Hanna "'750" Fluid Power Cylinders are truly new. Together with their proved companions, Hanna LP and Hanna HP Cylinders, they offer a complete range of capacities, sizes and mounting styles to suit your requirements. For details, ask your Hanna Representative (see your classified telephone directory), or write for the new Catalog. No obligation.



Hanna Engineering Works

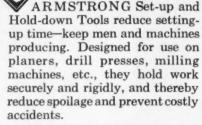
1758 Elston Avenue - Chicago 22, Illinois

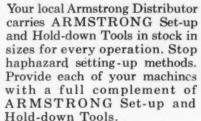
# ARMSTRONG

SET-UP and HOLD-DOW Tools



JACKS





Write for Circular





#### ARMSTRONG BROS. TOOL CO.

"The Tool Holder People" 5228 W. Armstrong Ave., Chicago 30, U.S.A.

















STRAP CLAMPS

# Machine Shop

Vol. 27, No. 4 SEPTEMBER, 1954

# features in this issue

#### Hand Forming Is Here to Stay

By Gilbert C. Close

In pointing out that hand forming departments are not supplementary to but close gaps that cannot be filled by automatic production, the author's discussion covers a typical and well-tooled example of a precision hand metal forming department found at Longren Aircraft. Page 124.

#### How to Machine Stainless Steels, Part II

By Lester F. Spencer

In this concluding installment, the author continues his discussion of operational procedures on stainless steels, commencing with the subject of reaming. Page 132.

#### Carbide Tooling for Multiple Spindle Bar Automatics

By Fred W. Vogel

This article explains a project in which work is being carried on jointly by engineers of Cone Automatic Machine Company and Carboloy Department of General Electric Company to determine the most effective use of cemented carbides on multiple spindle bar automatics. Page 144.

#### **Machining Stainless Steel**

By G. J. Stevens

In this case history, the author presents a solution to deformation difficulties encountered in cutting off a narrow flanged stainless steel part. Page 152.

#### Welding Reduces Cost of Textile Machinery Parts

By Dimitri G. Soussloff

This article is based on a paper which received the first grand award, as well as a first divisional award, in the recent \$30,000 Mechanical Design Competition sponsored by The James F. Lincoln Arc Welding Foundation, Cleveland, Ohio. Page 158.

#### Daily Bird's-Eye View of Your Plant's Quality

By C. W. Kennedy

A handy statistical quality control technique is discussed which has application to mass production items, as well as job shop setups. Page 170.

#### Central Coolant System Featured in New Parts Plant

Benefits derived from the installation of a central coolant system for all grinding machines in the new Warner & Swasey parts plant at New Philadelphia, Ohio, are emphasized in this presentation. Page 196.

# Hand Forming Is Here to Stay

By GILBERT C. CLOSE

In pointing out that hand forming departments are not supplementary to but close gaps that cannot be filled by automatic production, the author's discussion covers a typical and well-tooled example of a precision hand metal forming department found at Longren Aircraft.

DURING a speech at a recent west coast industrial meeting, a well-known tooling engineer made the following remarks: "Today we can design automatic production machines that can do everything but think. But remember this, gentlemen . . . when in-process thinking is required, when variables exist that do not conform to any pre-

determinable pattern, or when the number of similar parts to be produced is small, automatic production become either impossible or too costly to be considered."

Whether or not he realized it at the time, this man's remarks were actually summing up the reasons and requirements for the huge hand metal forming departments that are

> growing in conjunction with the aircraft industry, and with other facets of heavy-duty and



Heavy 75S aluminum alloy sections, premachined from billet and extruded stock, constitute a large portion of the hand forming work. Here John Walti, chief tooling engineer, holds a wing attachment fitting that has been pre-machined and now must be formed to the proper contours.



A Longren-designed hydraulic press table with "feed back feel" in control handle. This table with its horizontal press action is very handy for certain types of work.

precision light metal production.

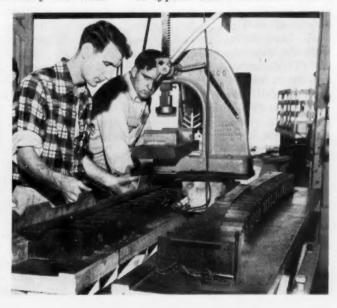
These hand forming departments are not supplementary to, but close gaps that cannot be filled by automatic production. They do work

that is practically impossible or too costly to accomplish on an automatic machine. The well-trained personnel manning these departments provide the one ingredient that is lacking on all auto-

matic production machines—the ability to think, to cope with unpredictable variables, and to make whatever detours and excursions are necessary to accomplish the desired

end result. In hand forming, much as in metal spinning, the human element is supplemented, not replaced, by machines.

A typical and well-tooled exam-



Checking a wing attachment fitting against a blade-type check fixture for contour and bevel. Small overhead press is used for hand forming minor adjustments.



This 12-ft. 200-gallon oil bath, electrically heated and temperature controlled, is used for reheating parts to 300 deg. F. after they have age hardened. The 75S alloy parts form easily at this elevated temperature, and the temporary temperature increase has no permanent effect on physical properties.

ple of a precision hand metal forming department may be found in the shops at Longren Aircraft Company, Torrance, California. Established in 1932, and as specialists in all facets of light metal forming work, Longren has literally grown with the west coast aircraft industry. The company boasts several important firsts; namely, first to form a full monocoque airplane fuselage in 1934, first to form \( \frac{1}{4} \)-in. plate for a monocoque cowling engine mount, and first company on the west coast to successfully stretch-form the new high-strength 75S aluminum alloy. Although the company maintains one of the largest independent stretch forming departments in the nation, its hand forming department has walked hand-in-glove with, and has often keyed, these progressive developments.

Hand forming work accomplished

at Longren may
be roughly
classified in
three categories
—prototype
forming work,
short-run forming work, and
forming work

where many unpredictable variables are encountered. Most of the work is accomplished on heavy structural aircraft members, including wing attachment fittings, wing spars, reinforcing bulkhead members, and other heavy forged or extruded structural parts. A large percentage of these parts are made from 75S aluminum alloy: forming tolerances are in general extremely critical and include angular tolerances, attachment tolerances, center-to-center tolerances, and, in many cases where forming may cause some deformity, shape tolerances as well.

Many prototype and short-run parts are finish hand formed for the simple reason that it is more economical to do it this way than to produce the requisite tooling for machine forming. The work involving complex variables may be either finish hand formed, or receive interim forming pending additional Here a short wing spar section is being hand formed in a hydraulic press immediately after removal from the oil bath. Oil is first swabbed from the part with a hand ray; later, part is vapor degreased.

machine work. An example of the latter might be a huge wing spar or bulkhead being machined from billet stock. During heavy rough machining these parts will often warp

sufficiently so that a new center must be established to assure a clean-up on all surfaces during the final machining operations. Just how and where such warpage may occur, its extent, and where pressure must be applied to counteract



it involves variables that defy machine solution.

"This is where the human factor plays an all-important role in hand forming work," says Hampden Wentworth, Longren's president. "And this is why we extend every

effort to obtain and keep adequately trained personnel in our hand forming department. Many of these men have been with us for years. We consistently provide in-plant



Checking a long, hand-formed wing spar section against a blade-type check fixture. In this operation, lead hammer blows are sometimes employed to form out small errors.



Longren - designed form blocks (hard chrome plated) being used to put a contoured bend in a wing spar section. Feedback valve gives the operator a 'feel' of the pressure being used.

training to increase their knowledge, and encourage them to take advantage of outside training courses whenever such courses are available."

John W. Walti, chief tool engineer, further emphasized the importance of individual judgment in hand forming work. "While our hand forming department is well stocked with conventional arbor and hydraulic presses of various sizes, and with a number of special Longren-designed forming machines, each of these machines is so tooled that it is under complete control of the operator when it is being used. We even use a feedback system on some machines so that the operator retains a 'feel' of the pressure being applied through the handle of the control being used."

To point-etch his remarks, Mr. Walti pointed out one arbor press that had a slight but visible give in the table when pressure was applied. "We built a new press with a solid table to replace that one," he said, "but the boys wouldn't

use it. They liked that slight amount of table give. It told them better than a pressure gage just how much deformation they were getting, and how the part was reacting to the pressure."

When the 75S aluminum alloy parts arrive at Longren, they are first heat treated and then refrigerated to retard age hardening until the first stages of hand forming work are accomplished. If additional forming work is required after the part has age hardened, it is reheated just prior to forming to 300 deg. F. in a temperature-controlled oil bath. The time-cycle of this reheat is carefully controlled so that the part is removed from the oil bath as soon as it is heated through. While 300 deg. F. is far below the critical temperature of 75S aluminum alloy, prolonged maintenance of this temperature might result in some effects on the physical properWing attachment fitting mounted on a master check plate for critical checking of contours, angles, centers, and so on.

ties. 75S is one of the few aluminum alloys that will readily respond to a noncritical yet substantial temperature rise with a harmless and a temporary decrease in strength and an increase in ductility.

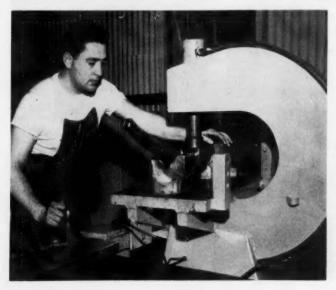
Some of the hand forming work requires the use of templates and check fixtures. These are generally tooled by Longren engineers, using information acquired from the engineer-

ing drawing of the part. In a few cases, the firms supplying the work to Longren provide pre-built templates and check fixtures.



In general practice, the part is first hand formed to a rough shape using any applicable forming method. Arbor presses, hydraulic presses,

twisters, and so on, may be employed. During the final stages of forming, the part is frequently referred to the check fixture. As a final check, the part is mounted on a master surface or check plate, and all



Special arbor press with feed-back "feel" being used to form Cerro-bend filled square conduit section.



Shims and blocks in use during forming in an arbor press. How the operator obtains the required shape is based on his own experience. Note look of concentration on the operator's face as forming progresses.

ıla be the methods used detract from quality. Press platens and press beds may be blocked, shimmed, or otherwise altered to produce the desired results. Either impact or

cumulative pressure applications may be employed. A number of adjustable press bed accessories, most of them Longren-designed, are

contours, angles, center distances, and so on, are checked with a dial gage. Final delicate hand forming may be required to obtain specific

and very close tolerances.

As might be expected in work of this type, a minimum of control is exercised on how a part is brought to its required shape as long as none of

Special Longren - designed torsion and twisting machine with adjustable heads and dial gage indicator. Any degree of twist can be obtained. Springback is indicated immediately after twisting pressure is removed, and adjustments can be made at once.

available for simplifying the production of any type of bend; torsion twisters provide the same flexi-

bility.

The illustrations with this article provide a .cross-sectional view of the Longren hand forming department, the type of work done, and the tools on which it is accomplished. They depict as well the strong reliance that must be placed on individual acumen and judgment in this type of work.

When one employee was asked how much pressure he was using to bend a flange on a heavy bulkhead into the right position, his answer was typical . . . "I don't know, but it's just right." The unnoticed pressure gage on the pressure he was using read 32 tons.

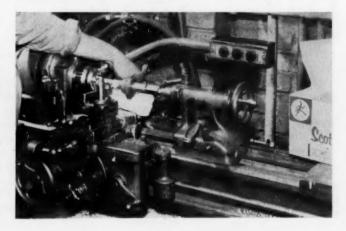
Only the uninitiated will theorize that automatic machine forming will ultimately drive hand forming out of the industrial picture. There is some forming work that requires an application of brains along with pressure. And there is still a wide distinction between the human brain and a control panel. So we'll cast our vote in the Old Fogy box . . . Hand forming is here to stay!

#### Resistance Welding Film

The Resistance Welder Manufacturers' Association, 1900 Arch St., Philadelphia 3, Pa., has announced that they have added to their film library a copy of "The Resistance Welding of Stainless Steels" which is available for schools, universities and plants for scheduled showings. The film, prepared by the Allegheny Ludlum Steel Corporation, is of particular value to production people and designers, engineers and metallurgists, and training courses and classes in technology. It records, step by step, the complete resistance welding operation and covers the various types of equipment used, the proper handling of stainless steels prior to welding, the different welding joints made and the precautions to be observed if the excellent properties of stainless are to be present in the finished product. The 16-mm. film runs for 21 minutes and has both sound and color.

#### Disposable Industrial Paper Wiper

A NEW disposable industrial paper wiper developed by the Scott Paper Company is shown being tested at the Chester, Pennsylvania, plant of Philadelphia Electric Company to clean up steel filings from a lathe in the machine shop.



# How to Machine Stainless Steels

Part II

New Britain, Conn.

By Lester F. Spencer\*

In this concluding installment, the author continues his discussion of operational procedures on stainless steels, commencing with the subject of reaming.

NE essential factor to consider in reaming the austenitic stainless grades is that sufficient material be left in the drilled hole so that a positive bite can be taken with the reamer. This will prevent dragging

\* Chief Metallurgist, Landers, Frary & Clark,

or riding of the tool, resulting in a work hardened surface. In addition. a positive bite will prevent burnishing, which would otherwise cause undersized holes and rapid reamer wear. However, if too much stock remains in the drilled hole so that the reamer has a heavy chip to re-

> move, it may produce an oversized hole.

> Either the straight fluted nose or spiral fluted reamer can be employed, the latter being preferred for the drilling of deep holes, since this type of reamer will remove chips more

20 USF 0.9375 0.4375 0.375 0.0937" R. 0.1875 R. Material — Type 303 Stainless Operations: 8. Index Turret 1. Clear 2. Center No. 228 Float, Holder 9. Recess No. 22HA Swing Tool-No. 22F 3. Index Turret; Form Back Slide 10. Index Turret Reverse Spindle 4. Drill No. 22B Float Holder 11. Tap No. 22A Tap Holder 5. Index Turret 12. Form Front Slide 13. Cut-off Vertical Slide Index Turret Bottom No. 228 Float, Holder

14. Feed to Swing Stop

Fig. 7 - This sketch illustrates a typical turning job perform-ed on a type 303 stainless steel knob.

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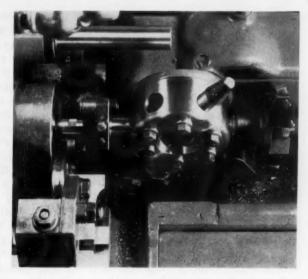
Knurl No. 22KA Swing Tool-No. 22F Guide

Fig. 8—This illustration shows how knurling swinging tool is held in turret and operated by cross slide. Illustration courtesy Brown & Sharpe Manufacturing Company.

readily from the drilled hole. Thus, a drilled hole may leave a few chips and where a straight fluted reamer is used, it may carry around some of these chips and rough up the hole, or, in extreme cases, may clog the reamer and result in breakage. Where a

spiral reamer is used, a 30-degree chamfer is recommended. A left-handed or reversed spiral reamer is recommended—utilizing a 3 to 5-degree back rake, a 6 to 8-degree clearance angle, and a land from 0.005 to 0.015 inch in width. As in the drilling operation, accurate grinding is required; all angles and clearances should be maintained exactly for even cutting on all teeth.

Tapping and Threading Operations. The success of the tapping operation is governed by the quality of the drilled hole. The free machining grades of stainless usually offer little difficulty; however, special attention must be given in the selection of taps where either the austenitic chromium-nickel or the martensitic high carbon stainless grades are tapped. A 15-degree hook grind has been found to be effective for all grades. General shop practices suggested in the tapping of the stainless steels are given thus:



(a) Avoid tapping over 75 per cent thread if possible. A 50 per cent thread will be much easier to tap and, in many cases, will hold satisfactorily.

(b) Mount the tap in a properly aligned holder to avoid breakage when used in the turret lathe or screw machine; this, at times, precludes the use of a floating holder.

(c) Keep taps sharp at all times.

(d) For deep hole tapping, thin the lands by grinding the heels to reduce bearing areas, or use an interrupted thread style tap.

(e) For tapping large sized holes, one inch or more in diameter, collapsible type taps should be employed. Grind collapsible tap chasers with a 15 to 20-degree lip hook.

(f) For through holes use two fluted taps, or the gun or chip driver taps.

(g) When shortening a tap for bottom tapping, do not destroy the taper lead.

The nose of the tap is chamfered to distribute the cutting load and to make the cutting action as easy as possible, this chamfered surface being the only surfaces ground in resharpening a tap. Dull or improperly ground taps should not be used since not only will rough and poor threads, which may be oversize, result, but also chipping may result. A dull tap will cause excessive work hardening of the austenitic grades of stainless.

The chamfer employed will vary with the tap design. Thus, the following values have been suggested: (a) on tapered taps, the chamfer is from 4 to 5 degrees or 8 to 10 threads; (b) the plug tap will have a 9 to 10-degree chamfer or 31/2 to  $4\frac{1}{2}$  threads; and (c) a bottoming tap will have a 30 to 35-degree chamfer or  $1\frac{1}{2}$  to 2 threads. In addition, the performance of a tap is also influenced by the rake angle of the cutting face, a value of 8 to 12 degrees being used. The back relief angle for the tapping of deep holes is usually 5 degrees.

One of the difficulties in tapping stainless is having the chips clog behind the cutting edge, thus causing the tap to seize or even break when the spindle is reversed. This can be minimized by using a two-fluted tap, often referred to as either a chip driver or a gun tap. This type tap is the strongest design and is usually used on work up to 3/8 inch in diameter. However, the two-fluted tap may not prove satisfactory for holding a Class III fit in large sizes. A three-fluted tap has less tendency to cut oversize, but has less chip clearance, whereas a four-fluted tap is

usually for larger sizes and for deephole operation.

In tapping the austenitic stainless grades, the tap size is usually one size larger than that employed for the carbon steels due to the fact that the threads tend to swell. Tapping operations must also be performed in one operation due to the work hardening characteristics of these materials. However, with both the ferritic and the martensitic compositions, both a roughing and a finishing tap can be employed when an unusually smooth thread is required. Also, a two-thread tapping operation is performed due to the economies of increased tap life.

Self-opening die head chasers are used for the external threading of ½-inch diameter stock and upward; the four principal types of chasers are described as follows:

- (a) The tangent type is most generally used for close tolerance threads. It is particularly adapted for heavy duty jobs such as Acme threads or long, coarse threading. Whenever possible use a 20-degree throat. For National Coarse and National Fine threads, where the threads do not run into a shoulder, a 15-degree throat is desirable. Single Acme threads require a 12-degree throat angle and double Acme threads require a 7-degree throat angle.
- (b) The circular type is really the universal thread chaser, as it is adaptable to all types of threads and will work equally well on tubing. This type of chaser generally works well with a 25-degree throat angle.
- (c) The insert type of chaser is widely used since it produces good

Fig. 9-In this illustration, a recessing swing tool shown cutting a recess. Il-lustration courtesy Brown & Sharpe Manufacturing Company.

threads at a low cost. a 20-degree throat angle being usually recommended for this type of chaser.

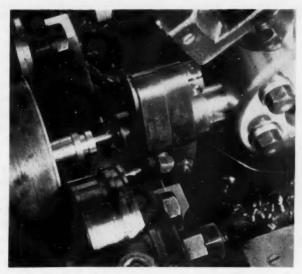
(d) The radial type chaser is widely used on screw machine jobs where extremely fine threads are required on stainless, Radial chasers seem to work best on average jobs

with a 20-degree throat angle.

As in tapping, the throat angle or chamfer spreads the cutting burden over several teeth. This value varies slightly for each of the chasers described, according to the type of thread being cut and the grade of stainless used. Usually a 11/2 to 3thread chamfer is employed; however, where a full depth thread must be cut as close to a shoulder as possible, a 1-thread chamfer is required. In general, it can be stated that longer chaser life can be expected when long chamfer dies are used.

Balanced cutting is imperative; improper grinding practices where one jaw will do all the cutting will place a severe strain on the die, resulting in a rough thread. Also, the chamfer surface must not only be ground to the proper angle, but it must be given the proper concavity to give cutting clearances. A rake or hook angle of approximately 15 de-

grees is satisfactory.



Acorn or button dies, while not recommended, should be provided with a hook grind if used on stainless. If the die loads and has excessive pickup, the lands should be reduced. As in tapping, both a roughing and a finishing thread operation are performed where particularly smooth threads are required. The finishing operation should remove approximately 0.005 to 0.010 inch in the final operation with lapped finished ground chasers. It is also suggested that close tolerances on the rough threading operation be maintained since any variation will reflect in the finished thread size.

Milling Operations. The milling operation is exactly the opposite of turning in that the metal is fed into a revolving cutting tool. Due to the variables existing in this type operation, a few generalizations can be made which may be helpful. The smoothest finishes are obtained with helical or spiral tooth cutters running at high speed, a shearing action being experienced which results in less chatter and freer cutting than with the straight tooth type. Coarse tooth cutters are preferred since they are under less strain and permit higher speeds than fine tooth cutters. In addition, due to the wider spacing between teeth, clearance of chips is less of a problem.

The speed of operation is dependent usually upon the depth of cut. Thus, a roughing cut would be employed with heavier feeds and slower speeds than those used for the lighter finishing cuts. In addition, regardless of the depth of cut, the considerable heat that is generated during milling must be dissipated by the use of a copious amount of cutting fluid. If this is not done, the work may distort and the tool edges will dull or chip rapidly. Once a milling cut has been started, it should continue to completion since stopping and then restarting may result in undercutting. If the cut must be arrested, it is best to back the tool two or three turns behind the work before restarting, since this will eliminate the danger of "backlash" and minimize undercutting.

The action of milling cutters is intermittent, each tooth starting with a zero chip thickness and ending up with a maximum cut. Therefore, sufficient clearances behind the cutting edge of every tooth are necessary to avoid a rubbing or burnishing action, a value of from 5 to 12 degrees being given. A rake angle of 5 to 10 degrees is suggested with each tooth having a narrow land of 0.015 to 0.030 inch. "Hogging in" and excessive vibration generally in-

dicate too much rake or may possibly indicate that either the clearance is insufficient or too high a cutting speed is employed. Use short stubby arbors with large diameters whenever possible. Rigidity improves the job.

When cylindrical shaped cutters are employed with teeth on the outer surface only, helical cutting teeth wider than 3/4 inch should be used; the shearing action experienced will lessen chatter and produce fine finishes. Cutters under 3/4 inch in width can have straight teeth. In the cutting of deep slots, a staggered tooth cutter design will minimize such difficulties as chatter, binding and jamming of wide chips. Its alternating teeth cut only one-half of the slot, thereby taking a smaller bite and producing a shorter chip. For end milling, the solid shank end mill is preferred.

Broaching. One of the prerequisites in broaching is that there be no interference with the action of the broach. A broach is a simple tool for the operator to handle, since the necessary feed and depth of cut by steps from one tooth to the other are provided within the tool. Basically, a broach will incorporate, in one tool, the roughing cut, the semi-finishing cut and the final precision cut. Some broaches are made with the addition of burnishing buttons where a burnished surface or finish is required. The form or shape of a broach tooth is unlimited with the result that there are no limitations to the shape or contour of broached surfaces.

There are, in general, two types of broaches, the vertical and the

Fig. 10 — Operation sheet used in producing intricate workpiece from type 416 stainless steel.

horizontal broach, either of which can be used for push or pull broaching. On internal broaching, a properly drilled or reamed hole is satisfatory. On external or surface broaching, preliminary machining operations are seldom required.

In designing the radius for the broach tooth, the manufacturer provides maximum tooth strength and a "pocket" for chips. Other factors would include side relief for flat broaches. undercut and clearance for spline broaches, and chip break-

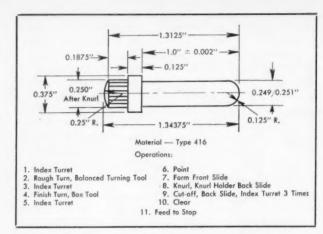
ers to handle wide chips. These vary in accordance to the specific job. On internal broaching, the "back-off" angle should be held to a minimum of 2 degrees and not more than 5 degrees. Too much "back-off" will shorten broach life due to size reduction for resharpening.

| MATERIAL: | <b>Stainless</b> | Steel | 1/4 | No.  | 416 |
|-----------|------------------|-------|-----|------|-----|
| SECONDS I | OR ONE           | PIECE | _   | - 70 |     |
| GROSS PRO | D. — 51          | per h | our |      |     |

| SPIND, RPM<br>456 2280 |      | ORDER OF OPERATIONS AND TOOLS                    |        |  |  |  |  |
|------------------------|------|--|--------|--|--|--|--|
|                        | 106  | Turn and Center—OOA Knee Tool                    | .0014  |  |  |  |  |
|                        | 53   | Ind. Tur   |        |  |  |  |  |
|                        | 93   | Drill 1285 Dia OOAC Floating Holder              | .0024  |  |  |  |  |
|                        | 53   | Ind. Tur   |        |  |  |  |  |
|                        | 143  | Drill .055 Dia.—OOAC Floating Holder             | .0012  |  |  |  |  |
|                        | 93   | Pullout  |        |  |  |  |  |
|                        | 65   | Drill  | .001   |  |  |  |  |
|                        | 53   | Ind. Tur   |        |  |  |  |  |
|                        | 170  | Rough Ream .140 Dia. and Taper-OOAC Float. Hold  | .0014  |  |  |  |  |
|                        | 53   | Ind. Tur. (Form-Front Slide)                     |        |  |  |  |  |
|                        | 108  | Finish Ream .145 Dia. and Taper-OOAC Float, Hold | .004   |  |  |  |  |
| -                      | 66   | Ind. Tur. and Change Speed                       |        |  |  |  |  |
|                        | 66   | Thread-Die Head                                  |        |  |  |  |  |
|                        | 53   | Ind. Tur. and Bring Swing Tool To Position       |        |  |  |  |  |
|                        | 425  | Turn Taper005 Swing Tool                         | .0013  |  |  |  |  |
|                        | 32   | Ind. Tur.—Burr. Vertical Slide (439 Rev.)        | .0003  |  |  |  |  |
|                        | -120 | Drill—.018 Dia. — OO6 Floating Holder            | .0003  |  |  |  |  |
|                        | 147  | Pullout Drill                                    | .00025 |  |  |  |  |
|                        | 166  | Pullout — Drill                                  | .0002  |  |  |  |  |
|                        | 146  | Pullout — Drill                                  | .0002  |  |  |  |  |
|                        | 133  | Clear  |        |  |  |  |  |
|                        | 160  | Cut-off-Back Slide (160 Revs.)                   | .0009  |  |  |  |  |
|                        | 133  | Feed Stock to Swing Stop                         |        |  |  |  |  |
|                        | 2660 | Total Rev. @ 2280 RPM                            |        |  |  |  |  |
|                        |      |  |        |  |  |  |  |

MACHINE SPECIFICATIONS:
No. OOG H.S. Auto. Screw Machine
With Vertical Slide Attachment

Broaches should be handled with care since any nicks on the cutting edges of the broach will result in scored work surfaces. Broaching can be performed on stainless that has a hardness up to Rockwell C35; above this limit, broaching can be performed prior to a heat treatment. To re-



move any light scale resulting from heat treatment and to correct possible distortion, a special broach known as a "hard gear broach" should be used if sufficient power is available in the equipment used.

#### Typical Work Jobs

Typical jobs as performed on the Brown & Sharpe automatic screw machine will be given. However, in the sequence of operations, there are a few operations which have not been previously discussed. This will be done as we discuss each job. In Fig. 7, the knob illustrated is turned in a No. GHS automatic, all turret and slide positions being occupied.

Floating holders are employed for the drilling operations, the centering operation being followed by two drill operations. For the bottoming operation, a flat ended drill is used, the depth of the hole being ½ inch. Both cross slides have form tools and, as previously mentioned, adjustment of these form tools is required to obtain a blending of the two cuts.

Fig. 11—Operation sheet for turning knurled stud from type 416 stainless steel.

Two operations which have not been previously discussed are recessing and knurling, which are performed by a swing tool operating from the turret activated by the cross slide position. Knurl-

ing can be produced in a variety of methods as follows: (a) the adjustable knurl holder positioned in the turret is designed to produce the knurling effect from the end of the workpiece; (b) the side knurl, activated from either the back or front slide position, is used to knurl at some distance from the end of the workpiece; (c) either the bottom or top knurl holder, the design of which permits the combination of both knurl and cut-off, is activated from the cross slide position, and is used for knurling sections nearest to the collet of the machine: and (d) the knurling swing tool, which is designed for use in the turret position, is employed under conditions where other designs are not practical to use.

As mentioned previously, the knurling swing tool is employed in this specific job; Fig. 8 illustrates the operation. This tool is in the fourth turret station. Due to the rounded form to be knurled, the knurl holder, which is held in the turret position, cannot have a tur-

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ret movement when the knurl is in contact with the work, and feeding of the tool must be made from movement of the cross slide.

Another tool operation is that of recessing, for which the swing tool is employed. This tool type is quite versatile, performing such operations as turning, forming, cutting off, boring, chamfering, and recessing. In the use of this type tool, it must be made as large as possible to realize maximum strength and stiffness; however, the factor of chip room must not be neglected.

In this specific operation, the swing tool, which is illustrated in Fig. 9, forms the groove or recess at the end of the drilled hole. The groove is deep enough to have a diameter a little greater than the root (largest) diameter of the internal thread; thus, when the tap cuts the threads, they can all be full depth threads.

The item, as illustrated in Fig. 10, employs the knee tool for the combination centering for drilling and

turning. The reaming operation following drilling is in two stages, roughing and finishing, floating holders being used for both the drilling and subsequent reaming operations. The swing tool, in this instance,

is used for taper turning. As indicated in the operation sheet, this is an intricate job which requires a special 8-hole turret for carrying the tools and, in addition, both cross slides are occupied. Thus, a vertical slide attachment is required to complete the piece.

The knurled stud, illustrated in Fig. 11, is turned on a No. OGHS Brown & Sharpe automatic, three turret and both slide positions being occupied. Since the circular cut-off tool does forming on the head of the workpiece, it should be ground without rake or hook. In addition, the knurl tool design is different to that previously employed; thus, since knurling is done nearest to the collet of the machine, a top knurl holder, positioned on the back slide with the cut-off, is used. This type of knurling operation is illustrated in Fig. 12.

The previously discussed balanced turning tool is employed for rough turning, sufficient stock remaining so as to permit a finishing

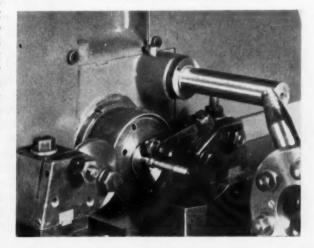


Fig. 12 — This illustration shows top knurled holder in place on cutting-off tool. Illustration courtesy Brown & Sharpe Manufacturing Company.

cut with the box tool. This type tool is illustrated in Fig. 13. Although the balanced cutting tool is making a roughing cut, it should be remembered that the better the finish produced by the roughing tool, the finer the finish which can be obtained with the finishing tool. If the roughing tool leaves a good finish, then only a very light cut is required of the box tool when finishing. Usually, when a light finishing cut is made. a chip control groove is not required. In this specific job, both rough and finish turning are performed up to the shoulder, or that distance which is specified as 1 inch on the drawing.

The pointing tool, which is a new tool type, is used directly after finish turning with the box tool; the specific function, in this instance, is rounding the outer end of the workpiece. This type tool can also be used for chamfering or for turning a short length on the end of a workpiece. In this instance, adjustments of the pointing tool will have to be made so that the rounded end will blend with the body of the stud. If the tip is not cutting to proper depth, a small circular teat will be left on the tip of the stud.

The shoulder remains the same diameter as the original stock diameter. The portion that is indicated as being knurled receives a preliminary forming operation, which is performed with a form tool on the front slide. This forming tool will face off the shoulder that has been left by the balanced turning tool, removing the 0.005 to 0.010 inch of stock left for this purpose. Depth adjustment of the form tool is required so that the 0.250-inch diameter produced by the form tool will blend with the diameter already finished with the box tool. As previously stated, knurling and cut-off operations follow performed by a combination tool operated by the back slide. The index of turret is tripled at the end of the operation since these positions contain no tools.

Other typical operational sequences are given in Fig. 14, the type of material and operations being designated. All of these parts have been made in a Brown & Sharpe automatic screw machine.

#### Conclusion

Essentially, the major difference in machining the non-free machining stainless as compared to the free machining grades is that the speeds are normally reduced, the free machining alloys usually being considered more adaptable for automatic screw machine work. In the machining the austenitic grades of stainless, regardless of type composition, it is essential to have constant feed at all times in order to prevent "work hardening." In all instances, improvement in cutting is realized through the selection of a proper cutting fluid and the proper preparation of the cutting tools.

The value of a sharp cutting edge is well known. However, the operator should realize that a stoned edge will produce the best finishes and will last longer between grinds. This latter point has been aptly illustrated in one plant where a stoned edge had lengthened tool life between grinds from an average of 2 hours to an average of 10 hours. The proce-

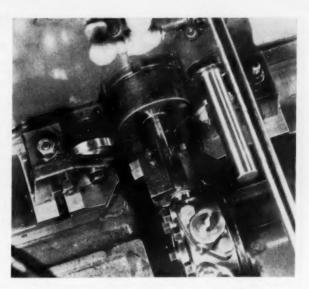
Fig. 13—In this illustration, α box tool with V-block back rest is shown taking α finishing cut. Illustration courtesy Brown δ Sharpe Manufacturing Company.

dure recommended would consist of (a) rough grinding on a 60 grit wheel; (b) 120 grit finishing to remove all 60 grit grinding lines; and, (c) final finishing on a 150 grit wheel. In fact, it has been stated that a final finishing with a 320 grit wheel has been found advantageous in increasing

tool life. In any of these finishing steps, the operator must be careful not to rush the work since "hogging" may produce not only a slight burning of the tool, but also fine grinding cracks.

The possibility of the use of carbide tooling should be explored thoroughly in relationship of equipment that is planned to be used. Thus, to get the full advantage of carbides, the following conditions are required: (a) the machine tool must be rigid and sturdy, having plenty of horsepower and no play in the bearings; (b) toolholders and chucks must be heavy so as to carry and rigidly support the tool; and (c) the tools must be heavier than usually employed so as to dissipate the excessive heat that is generated by the high machining speeds.

There are a number of varieties of cutting fluids available; however, in most instances, these lubricants usually are sulphurized since sul-



phur has been recognized for years for its ability to cool and prevent seizing. Thus, the two types of sulphurized oil that are generally recommended are (a) the sulpho-chlorinated oil containing active sulphur and approximately 8 to 10 per cent fatty oil with viscosity of approximately 200 seconds at 100 deg. F., this oil type being usually employed for the non-free machining stainless grades; and (b) a sulphochlorinated petroleum oil containing active sulphur without a fatty base oil, this oil type being usually employed with the free machining stainless and having a viscosity of about 130 seconds at 100 deg. F.

These oils are blended with paraffin oil, usually at a ratio of 1:1. The dilution required may often be determined by its action during machining. Thus, if there seems to be excessive wear on the tools, a greater percentage of paraffin blending oil is required. If the chips weld on the

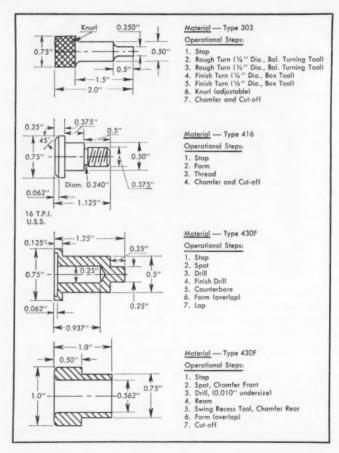


Fig. 14—Typical operational sequences for producing various workpieces from different types of stainless steel on Brown & Sharpe automatic screw machine.

rected on both the work and the tool edge at high pressures. Observe carefully so that there is no diversion of lubricant from the edge. Other factors that should be observed are (a) cleanliness of oil which precludes the use of filters and replacement of oil; (b) to obtain best cooling and lubricating properties. temperature the oil should never exceed

140 deg. F. (a temperature range of 75 to 125 degrees usually is recommended); and (c) fine finished ground and polished bars usually are sprayed with a light oil. Be sure to remove these oils since they are not good lubricants and repel cutting fluids.

tool, or the tool burns, the mixture is too lean and addition of the sulphurized base oil is required.

Of equal importance are both the quantity and the direction of flow of lubricant on the workpiece. Thus, a constant flow of oil is required. In addition, the lubricant should be di-

Forming and Bending Kaiser Aluminum. Prepared and published by the Technical Writing Department of Kaiser Aluminum & Chemical Sales,

Inc., 919 N. Michigan, Chicago 11, Ill. 272 pages. Illustrated. Cloth binding, board covers.

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practical procedures and technical advancements in forming and bending aluminum. It provides comparative data on various types of forming and bending equipment; characteristics of specific alloys and their suitability to particular operations; comparisons of methods: and technique suggestions to solve specific production problems. Not only is the reader able to select specific alloys to meet design needs from the information presented, but he also is aided in selecting the best method of fabrication involved on the metalworking machines described. A comparative study of aluminum with some of the ferrous metals is also made for different applications to assist in product design. Subjects covered in separate sections of the book

are forming with hydraulic and mechanical presses; bending with hydraulic and mechanical press brakes; forming aluminum in rubber; roll forming; spinning; bending pipe and tube with power and hand operated machines; and tensive and compressive forming. The book may be obtained free of charge when requested on company letterhead, or is available at a cost of \$2.00 for personal libraries.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.

#### Huge Fork Lift Truck

ONE of the world's largest fork lift trucks, a K51-600 Yale electric, is shown herewith transporting a die at the Wyman-Gordon plant in North Grafton, Mass.

Dual controls permit operation from either side of the truck, which is rated at 60,000 lb. at a 48-in, load center. Overall height is 166 in., and maximum raised fork height is 85 inches. Forks are mounted on a hydraulically operated tilting carriage. Fork spread is adjustable by means of a handoperated screw. Hydraulic lift and tilt. together with power steering, make the truck easy to operate.



### 

Cone Automatic teams up with Carboloy Department to study application of cemented carbides to automatic machines.

VEN though the development of cemented carbides made it possible to remove metal more quickly and easily than practically any other method known before, it has taken long years of experimentation to bring carbide tooling to the peak of usefulness in machining operations as may be found in metalworking plants today. One of the more recent frontiers to be crossed in the continuing development of wider application of carbide tooling is evidenced by a project now underway in which work is being carried on jointly by engineers of Cone Automatic Machine Co., Inc., of Windsor, Vermont and Carboloy Department of General Electric Co. of Detroit. Briefly, the project involves the determination of the most effective use of cemented carbides on multiple spindle bar automatics.

Benefiting from the joint efforts of the two organizations are users of automatic machines. Studies of the two engineering groups indicate that automatic users can expect a greater return on their capital investment through production increases on automatic machines of as much as 50 to 100 per cent.

Although the joint development program is barely beyond its initial

Left, two leveling screws produced in 7 seconds by carbide tooled automatics, center, standard inner race bearing produced in 10 seconds and right, shutoff valve center produced in 8 seconds.



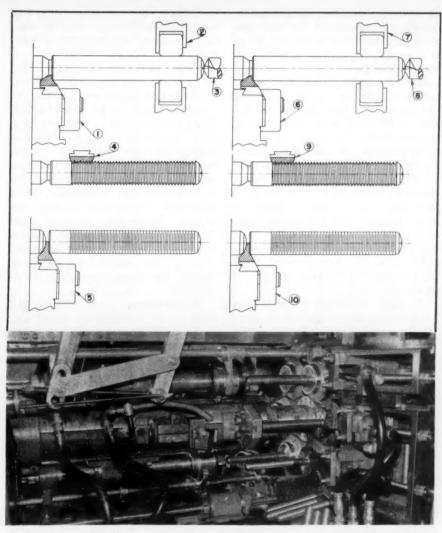


Fig. 1—Spindle and tooling setup for 50-h.p., 1%-in., 6-spindle Cone automatic for producing two 7¾-in. leveling screws simultaneously every 7 seconds. Cross hatching on sketches indicates Carboloy grade 370 carbide tipped tools at the six spindle positions; 1 indicates chamber; 2, three-roll support; 3, spot drill; 4, threading attachment; 5, form cutoff and feedout; 6, chamfer; 7, three-roll support; 8, spot drill; 9, threading attachment; 10, form cutoff and feedout. Workpieces are produced from 1-inch SAE B1112 steel stock.

stages, it has made great strides in multiple tool setups of automatic a short period of time. In a nutshell, machines are not barriers to cethe engineers have found that: (1) mented carbides; (2) tool holders,

as well as auxiliary attachments, should be engineered to meet job conditions of automatics; (3) proper selection of carbide grades and correct tool geometry are more important in applying carbides to automatics than to other machines; (4) adequate horsepower to the work spindles is essential; and (5) a good method of supplying a generous amount of water-based coolant to the cutting areas is a must.

In the past, attempts to apply cemented carbides to automatic bar machines proved unsuccessful because neither the users nor machine tool builder could afford the time, due to the production schedules, to delve into the compounded problems created by the type of machine involved.

To date, cemented carbides have been successfully applied to practically every turning type of production machine tool with the exception of the multiple spindle bar automatic. As a result of the joint automatic machine-cemented carbide development program of Cone and Carboloy, the introduction recently by the latter of new cemented carbide grades such as the series 300 (grades 350 and 370) especially suited for continued, high speed operations, the answers to many of the reasons why the adaptation of cemented carbides to automatic operations has been a rather slow process are beginning to show up.

Cone engineers believed from the beginning of their joint effort that their machine was designed for carbides, but were not sure. However, shortly after the joint engineering program was launched, they realized that their machine was not only designed for carbides, but also was a natural for that type of tooling.

They found that machine weight, for example, was important, but not as important as where that weight was distributed to provide rigidity. The Cone machine met the test with only one design change—that was sealing bearings and shafts against water soluble coolants. The machine also was found to be a natural for more horsepower, and being able to distribute that power through the spindle. Since the machine itself basically met all the requirements of carbide tooling through inherent design, there was nothing left to do but to become thoroughly carbide minded.

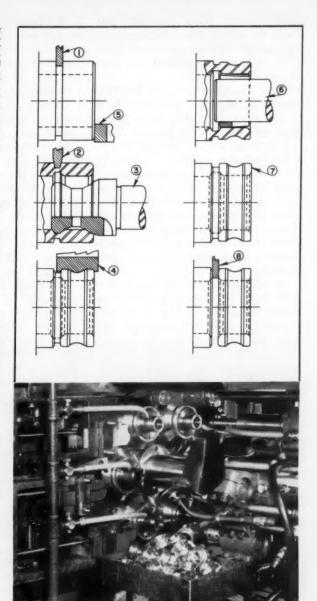
In reviewing the obstacles that had to be surmounted before carbides could be successfully used on Conomatics, Cone and Carboloy agreed on a program that would make use of conditions simulating as near as possible those in the field.

As most multiple spindle setups are individualized it was agreed to seek for development actual jobs that made use of the commonly known tools, and at the same time jobs that were representative of volume production by the machine. For example, one machine was tooled up to make use of end and side tools that are familiar to all users of "automatics." Another was set up to handle 52100 tubing in the production of ball bearing inner races. And a third machine was set up to handle the type of threading that can be accomplished with carbide tipped die head chasers.

Fig. 2—Spindle and tooling setup for 50-h.p., 2%-in., 6-spindle Cone automatic for producing one standard inner race bearing every 10 seconds. Cross hatching on sketches indicates Carboloy grade 370 carbide tipped cuting tools at each of the spindle positions; 1, breakdown blade; 5, form type but face; 2, form vertical; 3, internal recess; 4, form; 6, auxiliary spindle, ream; 7, left open for marking face; 8, cutoff.

In tackling the threading job — 7<sup>3</sup>/<sub>4</sub>inch long leveling screw for an automatic machine for one-inch diameter steel screw stock (SAE B1112) -the joint engineering task force tooled a 15/8-inch six-spindle 50 h.p. automatic with Carboloy grade 370 carbide, as shown in Fig. 1. In production, the machine produced the screws at the rate of two every 7 seconds, or 994 screws per hour. With high speed steel tools, the machine was capable of providing only 140 pieces per hour.

During the operation, the machine generated a direct spindle speed of 958 r.p.m., a die spindle speed of 628 r.p.m.—providing a total effective spindle speed of 1,586 r.p.m. for threading. Both chamfer and



cutoff carbide tools provided 700 pieces per grind, the threaders producing 1,000 pieces per grind. The feeds of both the chamfer and cutoff were 0.005 inch.

Some of the other interesting aspects of the job are: only half as many cutting tools as formerly required are used on the job. Also it is unusual to feed out and thread a piece of this length — especially when feeding two pieces simultaneously. Carboloy and Cone engineers point out in addition that many jobs running on 4-spindle machines, like the leveling screw, can easily be adapted to 6-spindle automatics with a terrific boost in production.

In tooling up a second machine—a 50 h.p., 25%-inch 6-spindle automatic, as shown in Fig. 2 — with Carboloy grade 370 cemented carbide, the engineering team produced standard inner bearing races at the rate of one every ten seconds, or six bearings per minute. Previously, with high speed steel tools, the production time reported was about double.

The bearing race, which had an outside diameter of 21/4 inches and inside diameter of 11/2 inches, was produced from SAE 52100 steel tubing with only seven carbide cutting tools, half as many as are required when using high speed cutting tools. The work, in this case, was run at a speed of 519 r.p.m. or 333 s.f.p.m. Tool life for the operations were: 724 pieces per grind for internal necking, 1,270 for butt facing, 1,518 for breaking down for cutoff, 1,890 for vertical form and breakdown. 810 for forming, 720 for cutoff and 1,270 for reaming.

In producing the center of an oil shutoff valve on a third 50 h.p. automatic, as shown in Fig. 3, the production rate was boosted with carbides to one every 8 seconds. Formerly, high speed steel tools produced only one center every 45 seconds. In this case, two subsequent operations, centering and grinding, were completely eliminated in finishing the part, through the use of carbides. Here, the job was engineered to use Carbolov grade 78B carbide as turning tools, and Carbolov grade 370 carbide for breakdown forming, form taper, finish groove, shave and cutoff.

The work was machined from one-inch hex SAE B1112 steel on a 11/2-inch, 6-spindle automatic. Tool life for the operations were: 700 pieces per grind for double turning, 700 for butt facing, 500 for breakdown form, 450 for form taper, 400 for form grooving, 800 for shaving, 500 for breakdown and 350 for final cutoff. High speed steel tools were used for spot drilling and for chaser tools since, in this case, both operations are not critical for the job, and work can be done while the other operations are in progress.

Playing an important role in all three of the jobs was the type of coolant employed. It was found that Houghton Antisep All-Purpose Base satisfactorily met all requirements. This coolant has high saponifiable content which improves lubricity. It is treated for protection against rancidity or dermatitis. It contains sulphur for anti-welding purposes.

The engineering team found that by sealing off bearing and spindles

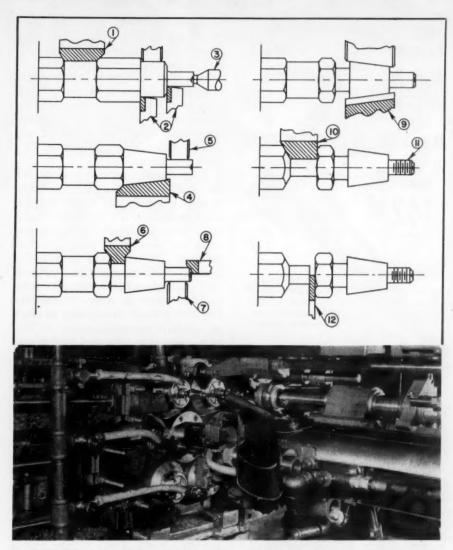
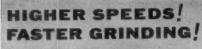


Fig. 3—Spindle and tooling setup for 50-h.p.,  $1\frac{1}{2}$ -in., 6-spindle Cone automatic for producing one center of an oil shutoff valve every 8 seconds. Cross hatching on sketches shows carbide tipped cutting tools at the six spindle positions; 1, form; 2, two-tool roll turner; 3, spot drill; 4, finish form; 5, roll support; 6, finish form groove; 8, butt face, shawt type; 7, roll support; 9, shave attachment; 10, radius form; 11, threading attachment; 12, cutoff.

of the automatics, water soluble coolant did an effective job of cooling both the machine and cutting

tools when machine speeds were increased ten times. The coolant served to remove the heat generated in



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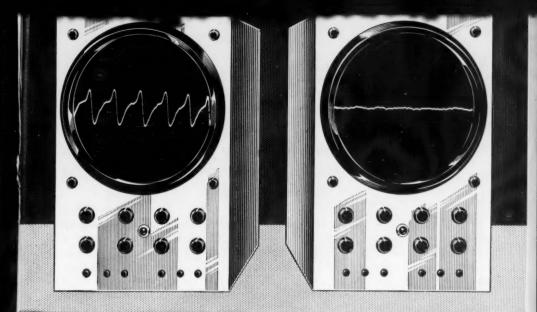
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the machine itself, plus that generated while the cutting tools went to work on the metals. Effectiveness of the cooling method on the machines was such that Cone engineers were able to decrease bearing clearances of the machines, and to adjust slides and carriers to closer tolerances. The end effect of all this is reflected in the three jobs described above.

Theoretically, with the same tool material on a job equally adaptable to both multiple and single spindle bar automatics, the multiple should out-volume the single in accordance with the number of work spindles involved. To maintain so great a production advantage, Cone believes that multiple spindle bar automatic builders must prepare to provide the user with machines with at least as efficient accommodation of carbide tools as is provided by the single spindle machines.



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### Machining Stainless

Steel

By G. J. STEVENS\*

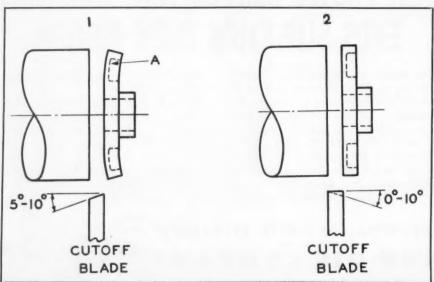
In this case history, the author presents a solution to deformation difficulties encountered in cutting off a narrow flanged stainless steel part.

Problem: When a narrow flanged part made from 1½-in. o.d. Type 416 stainless steel was cut off in a turret lathe, it deformed somewhat, as shown in Drawing 1.

The thin bottom section of the undercut A was subjected to a slight pressure by the cutoff tool when ground with the conventional 5 to 10-degree front relief angle. This deflected the blade into the side of the part and caused deformation.

\* Machining Engineer, Armco Steel Corp.

Solution: Drawing 2 shows how the cutoff blade was ground to a 0 to 10-degree front relief angle, just the opposite of the conventional method. An 0 degree front relief angle will balance the cutoff blade pressure. Any increase in angle up to 10 degrees causes the blade to deflect away from the work and produces a satisfactory part. Angularity of front relief in this operation is naturally governed by the feed of the cutoff blade.



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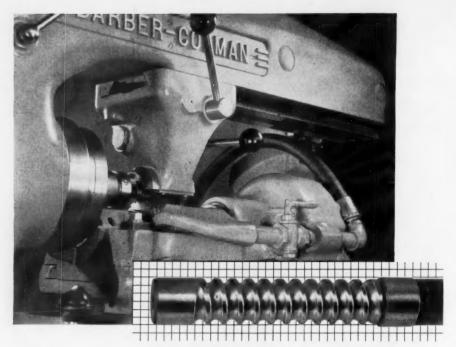


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## Standard Hobbing Machines Solve Special Problems

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Likewise, a standard No. 16-16 hobbing machine, with special work slide, hydraulic holding equipment, cam vertical feed and special cutter slide replacing the conventional hob slide, is arranged for internal thread milling the ball nut mating part. These jobs are examples of special applications which can be adapted to standard hobbing machine operation through special tooling and machine arrangements.

#### thread milling the worm

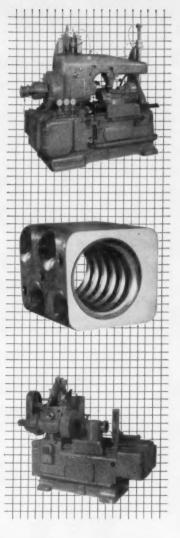
For milling the worm threads, the hob slide is equipped with a thread milling cutter and is positioned 90° from standard, so that the cutter spindle is parallel with the work spindle. The gear train has been modified so that feed and index gears advance the cutter properly to cut the worm threads. The work center bracket support has been designed to provide maximum rigidity of the work piece during the cutting operation. Vertical feed is used to plunge cut to depth, and then the cutter is fed axially to finish the thread.

#### milling internal threads on the mating part

The machine used to mill the internal threads on the mating part is a special No. 16-16 Hobbing Machine, with special cutter slide positioned permanently so that the cutter spindle is parallel with the work spindle. The gear train has also been modified to advance the cutter in proper relation to the worm threads. Hydraulic holding equipment is employed to clamp the ball nut in position for milling. Clamp and release are operated conveniently by a control valve located on the work slide upright.

Since the No. 16-16 Machine basically does not include vertical feed this arrangement has been added through cam action. A shank-type cutter with special outboard pilot support to steady the cutting action is used, since a small diameter cutter is needed for the internal cut.

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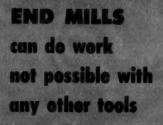




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## Welding Reduces Cost Of Textile Machinery

Parts

By DIMITRI G. SOUSSLOFF\*

This article is based on a paper which received the first grand award, as well as a first divisional award, in the recent \$30,000 Mechanical Design Competition sponsored by The James F. Lincoln Arc Welding Foundation, Cleveland, Ohio.

PERSISTENCY in the study and analysis of redesigning equipment parts for more economical manufacture will often pay handsome dividends. What looks good after the first try may subsequently prove far short of the ultimate potentialities, if only the designer refuses to be satisfied until he has explored every avenue of material, shape and construction detail.

A noteworthy example of the rewards for a designer's perseverance, and one which may be the forerunner of a revolutionary change in the concepts of building textile machinery, is a new type of fabricated rail or bed for the "Unirail" yarn uptwister, on which a cost saving of 71 per cent and a weight saving of 57 per cent were achieved over the conventional cast iron bed — but only after four tries.

This type of uptwister, briefly, is

a machine comprising a horizontal framework some 30 ft. in length, attached to two vertical end supports. The frame, basically upper and lower decks or "rails," supports a series of multiple spindles, as shown in Fig. 1, for turning bobbins filled with yarn, each with a take-up mechanism for winding the varn on another bobbin at a predetermined speed, thereby applying the required twist to the yarn. Drive, gearing and traversing mechanisms are installed at the ends of the machine, with endless belts powering the individual spindles.

In past designs, the two beds or rails have been made of cast iron, each bed having eight identical sections 42 in. long,  $21\frac{1}{2}$  in. wide and  $2\frac{1}{4}$  in. deep, ribbed to support bosses and to provide the necessary rigidity, as indicated in Fig. 2. With the two decks, one directly above the other, there are 16 cast sections per machine. The sections

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<sup>\*</sup> Associate Director of Research, Universal Winding Co., Providence, R. I.

weigh 135 lb. each, or a total of 2,160 pounds. The decks are held together securely by two vertical posts at the center of each section, which extend through machined holes in the bosses and are supplemented by a pair of pair of diagonal struts.

Extensive machining of the bed castings is necessary. Sides must be straight and square; some top areas must be absolutely square with the sides; and bushing holes to accommodate the support rods are bored and faced on both sides, the center distance between the two holes being held within 0.002-in. tolerance. Holes are drilled along the shallow sides to receive the twisting and

take-up units. Holes are also drilled in the ends of each casting to attach adjoining sections and in the top of each casting for mounting idler pulleys. Cost analysis over a large number of castings showed an average of \$30.33, of which \$16.45 represented the casting itself and \$13.88 the necessary machining operations.

Beyond the rather high cost, the old design was unnecessarily heavy, making handling difficult. Foundry limitations restricted the length, making it troublesome to accommodate variations in side hole spacing and to meet the requirements of specialized installations.

In first attacking these deficien-

Fig. 1—View of the four sections of a "Unirail" yarn uptwister, showing the clean lines of the redesigned arc welded steel bed and arrangement of support posts and struts.

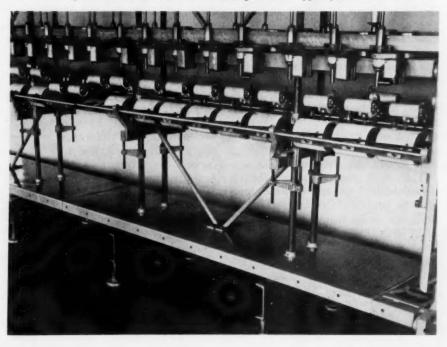




Fig. 2—Top and underside views of cast iron bed, with bosses at center to accommodate support posts. Sixteen of these beds are required per machine, involving high machining costs and excessive weight.

cies, design engineers investigated various types of composite construction, such as aluminum extrusions joined to cardings or weldments, die castings, and combinations of rolled steel and castings. All were discarded because of the minimum cost advantages they promised.

The next consideration was a complete bed of arc welded steel. It was proposed to form the top and four sides from a single sheet of 3/16-in. hot rolled steel, then to precut and prebend the center and diagonal braces for the underside and finally to weld the entire structure, plus the two bushings, in a jig. Specifications called for fillet welds of the intermittent type—1-in. weld and 3-in. skip. It was still

necessary to machine the ends to maintain a 0.005-in. tolerance, as well as to bore and face the bushings. The assembly looked good; it was sound structurally and saved about \$19. per unit over a casting. Still there was felt to be a better way of producing the assembly, a way that would eliminate end machining and utilize welding setup time to greater advantage.

It took no stroke of genius to determine that one method would be to combine two of the 42-in. rails

into a single 84-in. section, with the two bushings located halfway between the center at the ends on either side; in other words, four bushings per rail. This solved the problem of end tolerance on the shorter rails, since the double size formed a completely self-supporting structure which needed only to be bolted to the adjacent rail, without necessitating any precise abutment. At the same time, the number of rails for a single machine was reduced from 16 to 8.

A layout was suggested in which sheet steel was pressed in a brake to form the top and two sides, with short end pieces cut to size and welded in place. Diagonal and transverse reinforcing webs were Elistrom

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Yes, we'd like you to check any set of Ellstrom Gage Blocks. Check them block-by-block for size . . . for their consistent adherence to closer than specified accuracy. For flatness . . . parallelism . . . and the finish of their hard chromium plated gaging surfaces that give you greater serviceability, longer wearing millionths. And test them, too, for coefficient of expansion and controlled metallurgical stability. Then you'll know why it pays to standardize on Ellstrom Standards!

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Dearborn Gage Company • 22035 Beech Street • Dearborn, Michigan
Originators of Chromium Plated Gage Blocks



REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE UNITED STATES AND CANADA

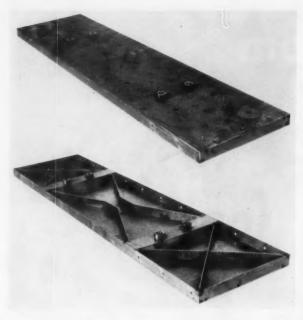


Fig. 3—Top and reverse side views of arc welded steel rail, twice the length of the cast design. Skip welding is used to attach bracing to the top sheet. This design effects a cost saving of 71 per cent and a weight reduction of 57 per cent.

disposed to brace the assembly on the underside, bushings then being welded to three sections of cross bracing. This arrangement was an improvement costwise, but involved what was considered too much machining on the bushings to hold the required center-line tolerance. The search went on.

Next, the possibilities of a "buildup" weldment were reviewed. Sheet metal angles were used to form sides and ends, braced by one longitudinal and two transverse channel sections and covered with a top sheet tack welded to the periphery of the four angles. Cost checks showed no savings and no appreciable advantages over the previous layout.

Reverting to the second design, with the three sets of diagonal plate bracing, the idea was conceived of welding the entire structure, allowing it to cool and then welding in completely machined hubs or bushings, with the aid of a precision jig. Since the bushings had only to be tack welded between two plates, little distortion occurred and it was easily possible to maintain re-

quired tolerances. This final design is shown in Figs. 3 and 4.

The design of the weldment was altered slightly from the original concept to simplify construction of the webbing and at the same time to provide a better stabilizing grip on the bushings. Skip welding was again specified, but with beads only ½-in. wide, spaced 3 in. apart.

The assembly has a total of just 14 pieces, other than the four hubs and their set screws. All made of 0.156-in. hot rolled sheet steel, these pieces include a top plate and two sides (single piece), two ends, two hub braces or plates, two diagonal center braces, two long cross braces, four short cross braces and a square center plate. There are ten 13/32-in. mounting holes punched in the top plate and ten 17/32-in. equispaced holes along each side. The

ends must be parallel within 0.030 in. maximum and square with the sides to the same tolerance. The top must be flat to 0.010 in. concave.

Cost analysis figured out to only \$17.44 complete, including tooling, material and labor burden. This is 71 percent less than the cost of the equivalent two cast rails and represented a considerable percent-

close to \$100,000 is apparent.

But beyond the matter of dollars and cents a number of additional objectives are realized from the arc welded design. They include: (1) the new part meets all functional requirements and is completely interchangeable with former designs now held in stock; (2) strength and rigidity characteristics are more

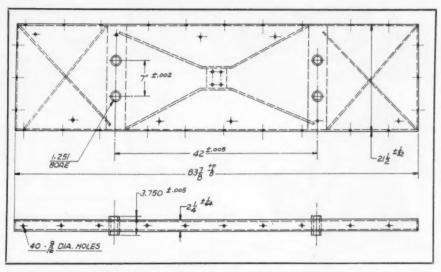


Fig. 4—Drawing showing details of weldment as finally designed. Top and sides are a single sheet to which ends and braces are welded before the four machined bushings are finally welded to the top sheet and transverse plates.

age of the total cost of the machine as originally designed. At the same time, tooling costs were well under those entailed by previous designs, being calculated at \$3730.

Significance of the cost reduction may be judged from the fact that yearly production of complete machines is expected to be between 200 and 300. With eight rails to a machine and a cost reduction of \$43.22 each, an indicated maximum annual manufacturing economy of

than ample, the welded steel rail being stiffer than cast iron as a beam lengthwise and almost as stiff in torsion about the long axis; (3) the new rail has considerable versatility, in that hole spacing, length and other features can be altered with a minimum of tooling expense; (4) production could be started immediately, without having to stock up a large number of parts in advance of assembly, as in the case of castings; (5) appearance is con-

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- · Precision-scraped gibs of extra length.
- Balanced design—precision manufacture.

17 models—6 to 80 tons. Air clutches available. Write for literature.

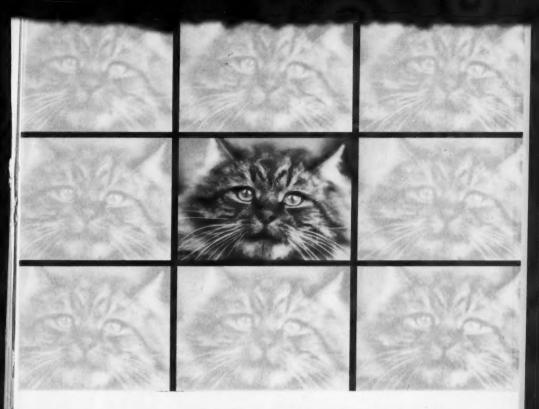


siderably enhanced by the clean, smooth top and side surfaces which, additionally, can be cleaned readily in service; (6) reduction in the amount of machining necessary freed machine tools formerly needed on the cast design; and (7) weight saving of 153 lb. over the cast rail meant easier handling in processing and installation.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.



"I wish they'd invent a machine to replace him."



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CIMCOOL is far superior to old-fashioned petroleum-based cutting fluids because it is a *chemical emulsion*. It replaces all water emulsions and all but a few highly compounded specialty oils. For a demonstration of how CIMCOOL

For a demonstration of how CIMCOOL increases tool life—just write us. We'll have one of our Cincinnati Millingtrained machinists call on you—without cost or obligation. Or, if you prefer, write for our free booklet, "Cimcool Defeats Heat." Address Sales Manager, Dept. S-94, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

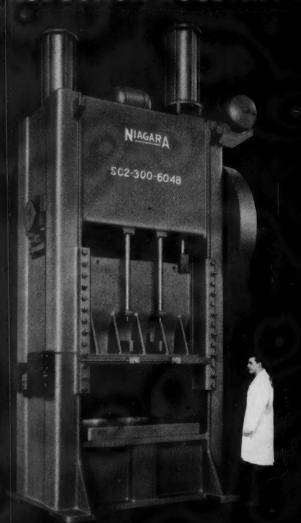
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All-steel, rigidly constructed frames, featuring an exclusive triple box section design, provide maximum resistance to deflection from horizontal, diagonal and torsional stresses. Greater accuracy and longer die life are thereby assured.

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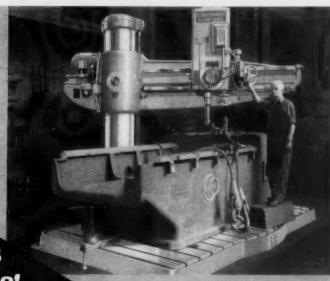
- · For use on Wells, Kalamazoo, Johnson, Famco and all other make Band Saw machines
- Try our Wavy Set for cutting angle iron, tubing and thin materials.

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- For use on Do-All, Grob, Tannewitz and other Band machines.
- · Stock ready to draw out.
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THE TOOLS IN THE PLAID BOX'S SAW & MFG. COMPANY

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years of experience speaks

"Well, if you don't buy a Cincinnati Bickford let me keep the one I have."

EMILE SHOULLARD



A close-up of 42-7284 Blanchard Surface Grinder.

Photos courtesy of the Blanchard Machine Company, Cambridge 39, Mass.

Extreme accuracy is required in drilling 12 holes in base of large Blanchard Surface Grinders.

Three of these holes are for 3" x 18" studs, which provide column adjustment, to required flatness accuracy of .0002° on an 84° diameter magnetic chuck. The diameter of the three bores for the column studs are held to + .0008°. Time on these operations was reduced an hour with the installation of this large Cincinnati Bickford Drilling Machine. This operator has not had an accident in 45 years of operating Cincinnati Bickford Super Service Radials. Twelve machines have been installed here, for their safety, production accuracy and general satisfaction.

Write for Catalog R-29.





RADIAL AND UPRIGHT DRILLING MACHINES

### THE CINCINNATI BICKFORD TOOL CO.

Cincinnati 9, Ohio, U.S.A.



In which the author discusses a handy statistical quality control technique which has application to mass production items, as well as job shop setups.

By C. W. KENNEDY

NE handy statistical quality control technique which can be particularly effective in many circumstances has been seldom brought to the surface and, therefore, has not been put to use in as widespread a fashion as it could be. The daily system of quality surveillance about to be described, once it is understood and tried, will pay dividends in a variety of manufacturing areas. The procedure has application to mass production items: yet it is equally useful and informative in job shop setups. In the small shop it might be practi-

cally the only inspection and quality control routine needed.

Large buyers of parts and subassemblies, including the Defense Department procurement agencies, place considerable emphasis on what is called the "quality level" of any plant that supplies them parts or products. Quality level is customarily described in percentages. If you hear that a certain plant has a quality level or a "process average" of 4 per cent, for example, it means that, day in and day out, an average of 4 per cent of what that shop makes is substandard, out of tolerance, defective or scrap.

Where a supplier has established a record for high quality, the big buyer knows he can save money by checking such purchases with very much reduced or intermittent sampling and, in many cases, he may feel secure in foregoing any sampling whatsoever of such a supplier's products. The situtation compares to a man's reputation and record for honesty enabling him to secure a bank loan more on character than on any physical collateral he may deposit.

A shop's quality level can be determined by summarizing and integrating all the daily inspection, quality and scrap reports naturally available. This method, however, may be cumbersome and expensive, requiring considerable clerical effort. Even then it may not disclose the true quality status because of duplicating or missing shop department reports.

A buyer will often appraise a supplier's quality level by constantly sampling purchases and keeping a running record of the percentages of substandard product his incoming inspections reveal. The supplier himself, however, cannot benefit from his customer's information unless he arranges to get continuous reports from the customer and such a request would surely be poor sales psychology. Far better for the supplier to tabulate his own shortcomings.

The simple quality procedure about to be discussed reveals a shop's process average accurately, objectively and inexpensively. In addition, it supplies a comprehensive, quickly scanned analysis of plant quality conditions and attitudes that is particularly valuable to supervision and top management. Ordinarily the system requires the effort of one inspector for about every hundred operations. The inspection expense, in other words, ratios at about 1 per cent of the production payroll covered by the daily quality survey.

Working from the report which is the result of the daily quality



"Large buyers of parts and subassemblies... place considerable emphasis on ..;, the 'quality level' of any plant that supplies them parts or products."

check would probably be the best way to describe the system. Such a report is reproduced in Fig. 1. The shop this sample report comes from manufactures small metal components for the pharmaceutical trade.

In setting up the daily plant quality check, ten "stations," so-called, were selected where the particular inspections would be made. Many more operations are performed on the parts than the report in Fig. 1 indicates but the "stations" represent those strategic locations where an inspection would give the most information about the product

itself at each point, as well as reveal any deficiencies in the chain of operations immediately preceding each station.

Going into detail, the inspector visits the "Cut Off" operation and takes a random sample of ten pieces from the work completed at Cut Off since the preceding inspection The report form in Fig. 1 shows that the inspector continued through the shop, looking over 10-piece samples of the work at the several designated stations listed in Column 1 and thus completed the record for the first round. With normal diligence, an inspector in this shop completes the inspection cy-

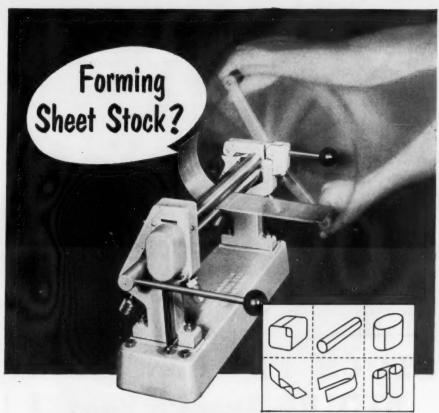
| OPERATION        | 1   | 2 | 3 | 4 | 5   | 6 | 7 | 8   | 9     | 10   | TOTA | L REMARKS                     |  |
|------------------|-----|---|---|---|-----|---|---|-----|-------|------|------|-------------------------------|--|
| Cut Off          | 1   | 0 | 0 | 0 | 0   | 0 | 1 | 0   | 0     | 0    | 2    | 2 burr                        |  |
| Grinding         | 1   | 0 | 2 | 0 | 0   | 0 | 1 | 0   | 0     | 1    | 5    | 1 short, 2 bunr, 2 square     |  |
| Pointing         | 0   | 0 | 0 | 0 | 0   | 0 | 0 | 0   | 0     | 0    | 0    |                               |  |
| Polishing        | 0   | 0 | 0 | 0 | 0   | 0 | 0 | 0   | 0     | 0    | 0    |                               |  |
| Cleaning         | 0   | 0 | 0 | 0 | 0   | 0 | 0 | 0   | 0     | 0    | 0    |                               |  |
| Assembly         | 1   | 0 | 1 | 0 | 0   | 0 | 0 | 0   | 0     | 0    | 2    | Ibung I bent                  |  |
| Pull Test        | 0   | 0 | 0 | 1 | 0   | 0 | 0 | 0   | 0     | 0    | 1    | 1 pull out                    |  |
| Sterilizing      | 1   | 0 | 0 | 1 | 0   | 0 | 0 | 0   | 1     | 0    | 3    | 2 burn Ichip                  |  |
| Inspection       | 0   | 2 | 0 | 0 | 0   | 0 | 1 | 0   | 1     | 0    | 4    | Hong, Isolden, 20hip          |  |
| Packing          | 0   | 1 | 3 | 2 | 0   | 2 | 1 | 1   | 1     | 4    | 15 : | burn 2 plating, 20hip, Ishon! |  |
| Inspecto<br>Date | 1/2 | 2 |   |   | I D |   |   | _ 1 | Per ( | Cent | Defe | tive <u>3.2%</u>              |  |

Fig. 1—Sample daily quality check report of shop manufacturing small metal components for the pharmaceutical trade.

round. As Column 1 in Fig. 1 shows, the inspector found one substandard part in the 10-piece random sample and made a record of it.

The inspector then proceeded to the "Grinding" operation, taking a 10-piece random sample of that work, and, as Column 1 in Fig. 1 shows, reported one substandard piece there. Continuing in the same manner on the first round of the day, the inspector traveled over to the "Pointing" operation. Again 10 pieces were examined. This time no defects were discovered. cle at each station and covers the total of ten stations in something less than 40 minutes.

Without particular interruption or delay, the inspector then starts along on round number two, with reported results showing in Column 2 of Fig. 1. By the end of the day or shift, ten trips have been completed, each round covering the ten stations listed. Each station has been visited ten times and a total sample of 100 pieces has been looked over by the time the day is done. Since there are ten stations, this



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sides of the bend. Special rolls are available for forming round, other shaped stock. Eight models. Rated capacity to 16 gauge. Forming widths from 6 to 42 inches.

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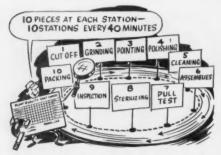
#### SEND FOR 32-PAGE CATALOG

Gives complete details on Di-Acro Rollers, Brakes, and hand and power operated Benders, Notchers, Press Brakes, Punch Presses, Rod Parters, Shears and Spring Winders.

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PRECISION
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MACHINES

O'NEIL-IRWIN MFG. CO., 306 8th Ave., LAKE CITY, MINN.

means the inspector has examined a grand total of 1000 pieces, in various production stages, of the



... an inspector... covers the... ten stations in something less than 40 minutes."

whole shop's work during any one day.

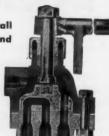
While the sample size of ten pieces may not be adequate, statistically, to offer an accurate picture of the quality of forty minute's worth of production at any one station, the accumulation of 100 pieces examined at that station during the course of the day does happen to approach statistical validity as a sample of a normal day's production. In other words, the same results might be obtained, as far as statistical accuracy is concerned, by securing one random sample of 100 pieces from the day's total production once a day at each station.

The latter system, however, displays two drawbacks. It would mean, for example, holding an entire day's production at any one station until the inspector could get his sample of 100 pieces, a bottlenecking few production schedules can tolerate. The system of taking ten pieces at a time in a series of

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Because Nicholson control valves are suitable for all mediums, they offer maximum use for interchange and replacement purposes. Unlike many poppet or balanced-piston valves, they can be used for steam as well as air, gas, oil or water. A prominent rubber firm reports that they carry only one spare valve for each 52 in service. Also CATALOG a larger choice of metal combinations. 552 Lever, foot, solenoid, motor types; size



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samples gains the same result of building up a 100 total sample by tagging along with, in a sense, the natural flow of production.

Taking one large, single, daily



"The day's work, once done, is so much water over the dam to the average production personnel."

sample also misses one of the more important psychological effects of the method under discussion. To sample a day's work after it is all done and to report back its condition later, fails to make anywhere as much of an impression on the operators as their gaining some idea every hour how they are doing in regard to quality. The day's work, once done, is so much water over the dam to average production personnel. But to learn at eight in the morning, for instance, that operations are producing substandard work is a horse of another color. Then add to the frequent and timely quality checkup the fact that the kind of trouble observed by the inspector is also reported, as Fig. 1 illustrates, under "Remarks."

Reverting again, briefly, to the matter of statistical accuracy, any purchaser who could examine a 1000-piece random sample of a vendor's product every day would gain a pretty adequate picture of that supplier's quality.

#### For Unvarying ACCURACY... Standardize on ECONOMY "TRU-LOC" **Adjustable Adapters** & Nut Economy CONCENTRIC "TRU-LOC" Adapter GROUND ACME THREADED BODY Sleeves "TRU-LOC" NUT - Lock in Any A.S.A. Drill Jig Bushings Position A.G.D. Plug & Ring ✓ WOODRUFF KEYWAY — Relieved Gages All items in stock - immediate delivery assured. Write for latest Bulletin and Price List. 1827 S. 68th St. Milwaukee 14. Wis.



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ANCE HANDS, new hype, available for all models.

GUARDS protect in-

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> INSULATED GRIPS prevent hand warmth from influencing gage accuracy.

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- \* PARALLELISM of anvils maintained, unaffected by tightness of clamping.
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**INDICATOR POSITION permits easy entry** of gage into narrow recesses. Advantageously placed for observation.

FULLY ENCASED MOVEMENT AND IN-DICATOR protected against accidental damage.

CLIP-ON STAND holds gage firmly upright.

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(except 0-1

gage).



11111 (Lever) TYPE

After the day's work is done, the count of defectives is added up and, as Fig. 1 shows, the total of the defectives divided by the 1000 pieces looked at gives a plant quality level figure in per cent defective. In most plants using this general device the daily per cent is plotted on a monthly chart, such as illustrated

The 3 per cent level was a per cent or two above the desirable level for the type of product being manufactured. Yet the chart gives little or no evidence of any factors that might be at work to lower the process average, or for the quality to worsen, for that matter. One would expect the quality level to re-

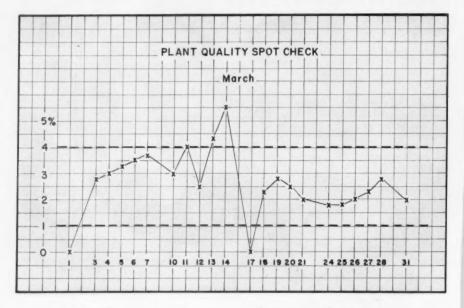


Fig. 2-Chart plotting daily per cent of defective pieces for one month.

in Fig. 2. This certain chart shows a process average in the plant for this particularly month of nearly 3 per cent. On the whole, the daily variations in quality level remained almost monotonously "in control," to use statistical jargon. Only four points fell outside the "control" lines during the month. For this reason, the chart points up one discouraging aspect of the factory's immediate quality problem.

main in about the same rut during succeeding months. In other words, management and supervision in this plant faced one of the tougher tasks in quality improvement — that of forcing a down trend in process average right across the board. Once an organization gets into the habit of working at a certain quality level the inertia of common daily practices makes an improvement in quality trebly difficult.

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- This CK milling machine has 24 different spindle speeds (13 to 1300 rpm), with 32 different table feeds (3/8 to 90 ipm). Operator was able to pick proper speed and feed, benefit from high horsepower modern tools.
- Greater rigidity of new CK column easily absorbs vibration from heaviest cutting loads. Only single pass needed for each part.
- CK's 3-bearing spindle and flywheel assures Maximum Cutter Efficiency. On this job, it meant fast metal removal and excellent finish in a single pass.
- CK's new heavy duty (2" dia.) table feed screw gives greater bearing contact for smoother feed performance and sustained accuracy.
- New CK machines have greater horsepower.

On this job, 25 hp permitted operator to get maximum production from this modern cutter.

HERE'S a typical example of how relatively inexpensive tooling greatly increases the versatility of Kearney & Trecker's new CK milling machines . . . producing a completed part every 6 minutes. Two operations were required for each part — (one) milling out the holes and recessing on the edges, then after changing the attachment setting and cutter — (two) finishing the inside (see photo). For the full story, contact your nearest Kearney & Trecker representative or write: Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wis.

Find out how you can LEASE a new CK machine. Write for Bulletin TL10A.



But a quick glance at the daily reports, like the one shown in Fig. 1, should offer immediate clues,



"... a quick glance at the daily reports ... should offer immediate clues... to particular areas where action can be concentrated."

however, to particular areas where action can be concentrated. Rather evidently something sloppy in the line of workmanship had gone on consistently all day in "Packing." Very evidently, too, the "Final Inspection" group had failed to perform its expected task of fully sorting the rejects from the good work. The report also shows a scattering of defects found in the work from "Grinding." From the goose eggs showing in the other rows and columns of the report in Fig. 1 little concern needed to be felt over the quality of production in those areas that day.

Here is where the plant quality spot check system being discussed has extra value. A minute's review of it gives a plant manager a bird'seye view of those areas where there has been a slackening in workmanship and where either temporary attention should be directed or perhaps where something in the nature



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|    | ease :  |       |      |      |        |   |   | rre   | 235 | E | lig | h | P | re | PC  | isi | io |
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| C  | mpany   |       |      | <br> | <br>   |   |   |       |     |   |     |   |   |    | . * |     |    |
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| Store TOOLMAKERS" | POS PO PO POS PARTINGAMENT OF THE TRANSPORT OF THE PROPERTY OF |
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|                   | THE L. S. STARRITT COMPANY, ATMON, MASSACHUSTITS, W. S. A.   |

#### GAMMONS=

#### TAPER REAMERS for all types of die work

- Specially treated for modern die steels.
- Rapid cutting capacity.
- Large range of standard sizes.
- Tapers per inch: .005, .008, .013.

MANCHESTER 2, Manufacturers of helical taper pin, chucking, die makers and special reamers. of a shakeup should take place.

On top of that, the daily reports (Fig. 1) and the plant quality chart (Fig. 2) reflect quality conditions and attitudes, knowledge of which is particularly useful to supervision and top management. The whole system is based considerably on the premise that lack of quality in the product shipped seldom comes about from an isolated condition or cause. Usually there is an accumulation or snowballing of in-

MM-M-M, POOR FELLOW, SHOWS AN ACCUMULATION OF PETTY SHODDINESS INATTENTION, IRRESPONSIBILITY IGNORANCE AND INEPT ENGINEERING



"Usually there is an accumulation or snowballing of individual incidents of petty shoddiness, ingttention, irresponsibility . . .

dividual incidents of petty shoddiness, inattention, irresponsibility, ignorance and inept engineering.

Two safeguards should be adopted in order to assure the greatest effectiveness of this plant spot check system. First, it goes without saying, the "roving" inspector chosen for this routine must be quite well versed in all the technicalities and specialties of the particular inspections and tests required at each station, as well as the visual standards. The inspector will not need to lug

Model 11/2 V Ram-Type Vertical

Fray

# MILLING

MACHINE

Available in 2 Table Sizes

9" x 36"—22" longitudinal travel

9" x 42"—28" longitudinal travel Moderate - Price Precision Milling Machine Offers

with Type 4 Precision Milling Head

#### 22" FROM TABLE TOP TO SPINDLE PLUS DOVETAIL WAYS FOR RIGIDITY

All the weight—all the stability you need in a medium-size, medium-price Precision Milling Machine. That's what the Fray Model 1½ V gives you in good measure. Designed to take full advantage of high speed steel cutters, the Fray Model 1½ V also provides the rigidity and speeds necessary for use with carbide cutters.

#### FRAY HEAVY DUTY

Available with 12½ " Standard Ram Travel or 20½" Optional Ram Travel. Extremely heavy construction, sustained accuracy. Has rack and pinion for positioning, with locking mechanism that assures positive clamping. Built-in worm adapter on ram positions head at desired angle.

Write for Circular No. 7 for complete details.

The Fray Type 4 Precision Milling Head is equipped with ½ h.p. motor, providing a standard speed range of 450-6400 r.p.m.—6 speeds. Optional with Back Gear Unit (extra cost): 150-6400 r.p.m.—8 speeds. Optional with Back Gear Unit and 2-speed motor (extra cost): 75-6400 r.p.m.—16 speeds.

MAY MACHINE 1001 CO.

Also available: 1 h.p. and 11/2 h.p. motors.





gages or anything like that around with him. He can use the equipment normally provided for inspections and tests at the locations chosen for his observations. If, at any station, the apparatus is not naturally adequate, a special setup for testing or gaging can be installed for the particular purpose. After all, it will or should be used at least once every forty minutes.

The other point of safeguard to be considered is that a definite ef-



"...the check inspector can waste a lot of precious time discussing his findings with the relevant production personnel."

fort needs to be made to keep this sort of check inspection routine on its naturally impersonal basis. The inspector should approach any station, get his random sample and perform the inspection with as little comment or sociability as possible. Whatever he discovers should be noted correctly and briefly on the report without undue verbal amplification, and he should go on quickly to the next station.

Attempts will be made constantly on the basis of honest curiosity or conscientious interest to learn how

he Whitnon

New Britain, Conn.

MANUFACTURING CO.

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# ...industry's greatest team for low cost, high speed hand welding

Lowest manual welding costs are achieved with "Jetweld", the high speed welding electrode developed and introduced by Lincoln, and "Fleetwelder"—Lincoln's AC transformer-type welder.

For the first time, "Jetweld" utilizes powdered metal in the

electrode coating... enabling use of higher currents to speed welding. Iron powder becomes an additional source of metal for the weld. Welds are more uniform, free of undercut, of X-ray quality.

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Lincoln's new combination of lower AC machine prices and faster welding with "Jetweld" can cut your welding costs. See for yourself. Have your Lincoln representative check your requirements for electrodes and welders. Call or write.

#### THE LINCOLN ELECTRIC COMPANY

CLEVELAND 17, OHIO

THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT

the quality stacks up at each station as the inspector makes his rounds, and the check inspector can waste a lot of precious time discussing his findings with the relevant production personnel. On the other hand this type of quality audit should not be utterly unfriendly or made with the sleuthing attitude of a municipal police detective or under the "restricted" and supersecret atmosphere of a congressional investigation. A brief display of the report form would probably suffice.

Occasionally the production groups will react to this form of quality surveillance with some attempt at covert dishonesty. This may take the form of being sure

> that the goods are moved away from the inspection station just before the inspector reaches it so that he finds no parts or material immediately available to check. Occasionally too a production group will make a special effort to scuttle the intent of the quality survey by withholding substandard work from view until the inspector gets by or by sorting out the evident substandard work just before the inspector comes up. These and others are common small subterfuges known to experienced inspectors.



# DO YOUR MILLING MACHINES POSE SERIOUS '54 DOLLAR-QUESTIONS?

Are your milling machines OLDER THAN YOU THINK? Are they eosting you more than you can afford? Recent surveys indicate many thousands of millers over 10 years old . . . and some even younger . . . have been so badly overworked that they are much older than their age implies. In terms of production efficiency, it would pay to "retire" them. Precision-wise and cost-wise, many "good looking" machines are dangerously too old to compete in today's production economy. Are your milling machines wastrels? Are they squandering dollars? Are they an "iron curtain" between you and profitable sales in today's competition? Wouldn't you consider abler replacements, as a sensible investment, to increase your ability to produce at a profit?

• You'll find sound answers to these 1954 dollar-questions in our BULLETIN\* on the new

#### IMPROVED TYPE "G" KEMPSMITH MILLING MACHINES

... free from cost-adding non-essentials ... fortified with proctical performance advantages ... economical in first cost and malentenance ... RIGHT for toolroom, maintenance, jeb shop and general precision production operations.



A 7829-1PC

Usually merely changing the timing of the inspection rounds or the order of stations will circumvent them.

Most everyone forgets that the type of patrol inspection or quality audit being discussed presents one important difference from all other inspections; namely, no rejections are made by the inspector! He examines the sample of work and puts the pieces or parts right back where he found them. (He may, of course, set aside any defectives he discovers rather than recontaminate the lot with them.) This type of inspector in no way orders the work held up for further checks or review nor does he order any operations to be stopped.

There's a GEROTOR Hydraulic PUMP

to meet your requirements!

The GEROTOR line of precision engineered hydraulic pumps is designed to fill the requirements of the majority of hydraulic equipment users. The three standard GEROTOR models cover a range of g.p.m. delivery from .4 g.p.m. to 40 g.p.m. Check the capacity tables for the pump to fill your needs.

QDB TYPE

New series of small capacity pumps . . . last word in precision engineering

| Type    | Discharge Pressure P.S.I. |      |      |      |      |  |  |  |  |  |
|---------|---------------------------|------|------|------|------|--|--|--|--|--|
| Type    | 0                         | 250  | 500  | 750  | 1000 |  |  |  |  |  |
| QDB .4  | .42                       | .40  | .38  | .35  | .31  |  |  |  |  |  |
| QDB .75 | .84                       | .80  | .78  | .73  | .66  |  |  |  |  |  |
| QDB 1.5 | 1.67                      | 1.62 | 1.57 | 1.50 | 1.42 |  |  |  |  |  |



#### Popular intermediate size of the Gerotor line

| m      | Discharge Pressure P.S.I. |      |      |      |      |      |      |  |  |  |
|--------|---------------------------|------|------|------|------|------|------|--|--|--|
| Type   | 0                         | 250  | 500  | 750  | 1000 | 1200 | 1500 |  |  |  |
| QDH 3  | 3.3                       | 3.2  | 3.1  | 3.0  | 2.9  | 2.7  | 2.5  |  |  |  |
| QDH 5  | 5.6                       | 5.4  | 5.3  | 5.2  | 5.1  | 4.8  | 4.4  |  |  |  |
| QDH 8  | 8.6                       | 8.5  | 8.4  | 8.3  | 8.2  | 8.1  | 7.8  |  |  |  |
| QDH 12 | 12.9                      | 12.8 | 12.7 | 12.5 | 12.3 | 12.2 | 11.8 |  |  |  |



#### When larger capacities are needed DELIVERY — G.P.M. AT 1200 R.P.M.

| PT   | Discharge Pressure P.S.I. |      |      |      |      |  |  |  |  |  |
|------|---------------------------|------|------|------|------|--|--|--|--|--|
| Туре | 0                         | 250  | 500  | 750  | 1000 |  |  |  |  |  |
| O-20 | 20.0                      | 19.5 | 18.8 | 18.0 | 17.2 |  |  |  |  |  |
| O-25 | 25.0                      | 24.5 | 24.0 | 23.2 | 22.2 |  |  |  |  |  |
| O-30 | 31.2                      | 31.0 | 30.5 | 29.8 | 29.0 |  |  |  |  |  |
| O-40 | 43.0                      | 42.5 | 42.0 | 41.5 | 40.0 |  |  |  |  |  |

Whatever your needs in hydraulic pumps ... consult the GEROTOR engineers. Write for FREE literature and information, no obligation, of course. GEROTOR MAY CORP., P. O. Box 86, Baltimere 3, Md.

**GEROTOR** 

HYDRAULIC PUMPS & MOTORS
Pneumatic Bin Evacuators
Precision Contract Mfg.

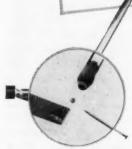
The value of the quality audit described in this article will be lost, or at least badly diluted, if the inspector is allowed to assume any management prerogative and order or suggest corrections, changes, scrapping or rework. Keep the inspector purely a reporter; let management write the editorials.

No specific rules can be given concerning the selection or location of the inspection "stations." Some trial and error will be necessary until it is found that the inspector is reviewing the condition of the product at

# PRECISION GEARS

**YOU** who use small gears, (to 6" O.D. of the gear blank) can improve the performance of your product, through increased gear precision, without sacrifice of gear production,

your gear production without sacrifice of gear accuracy, or improve your gear accuracy without sacrifice of gear production.



The Hamilton Precision Gear Hobber, the hobber with a "reserve of accuracy," regularly holds work spindle and hob spindle runout to less than .0002", workspindle and tailstock spindle alignment to less than .0002", and this workmanship is maintained throughout the machine.

#### WANT FACTS

Write for Bulletin No. 5419.
Address The Hamilton Tool Company
828 South Ninth Street,

Hamilton, Ohio.





USE IT WITH CONFIDENCE

those "critical" locations in the production chain where the most information is secured and where the greatest protection of product quality is obtained.

While the particular report covered in this article happens to describe a plant where ten stations made the most satisfactory arrangement, it does not necessarily establish the pattern for any other shop. In one factory the inspector visits thirty-three stations and succeeds in completing only four rounds per shift.

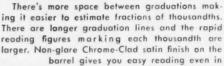
Similarly, the sample size taken at each station need not be necessarily ten units, although this is a convenient figure. Some "stations" may require a sample of twenty

> pieces in order to get an adequate picture of the quality of production in any hour. At some other location a five-piece sample might well be ample. On the whole. the system should be mapped out and timed so that the inspector sees about 100 units at any one station during the day and has examined a total of about 1000 units throughout the shop. How these totals are subdivided as to individual sample sizes, the numbers of stations and the number of rounds probably will have little effect on the overall picture

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More Accurate Measurements



poor light. Lufkin micrometers are easiest to adjust, too — the reading line keeps its original position directly in line of vision and the thimble doesn't cover measurements on the hub.



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In the new Lufkin Big Barrel Micrometers you have a choice of Friction Thimble, Ratchet Cap or Direct Feel only. You can have the exclusive new Lufkin Slip-Proof black crackle finish on the frame or Chrome-Clad satin finish. You can have any style with or without lock-nut. You can have carbide tipped anvil and spindle. The new Lufkin shorter design gives you better balance and the extended anvil and tapered frame permit you to take measurements in places inaccessible to other micrometers. You'll like the new Lufkin Big Barrel Micrometers — try the one of your choice today.

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Prices start at \$155.00—Install a couple without delay, and watch results.

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of quality level that is desired.

To make the system fully effective, the daily reports, like the one shown in Fig. 1, should go each day to the top level of manufacturing responsibility—to the superintendent, factory manager or to a vice president. The report, or copies of it, can be circulated daily among others who should be interested. The chart form, as shown in Fig. 2, is ordinarily kept in "Inspec-



"...daily reports...should go each day to the top level of manufacturing responsibility..."

tion" to be brought out occasionally to compare this month's quality with last month, and the like, or to present evidence of plant quality level to some customer.

Be prepared for one condition once the bird's-eye system is adequately installed, especially where the daily reports are more than casually scanned in the front office. You will probably never be allowed to discontinue the system or some form of it.



There is no way under the sun to do small, precision tapping with "production" speed, satisfactory tap life and acceptable accuracy, other than to use a tool designed for the specific purpose.

THE Hamilton SUPER-SENSITIVE
SMALL HOLE TAPPING MACHINE
IS SUCH A TOOL!

#### WANT ALL THE FACTS

Write for Hamilton Bulletin No. 5203. Address The Hamilton Tool Company, 828 South Ninth Street, Hamilton, Ohio.



# What's the difference between NT MAGNET CHUCK and an ELECTRO-MAGNETIC CHUCK? Which One

Some swear by one, some by the other — but there's a difference, both in the way they operate and in the holding jobs each does the best

A Taft-Peirce Superpower Permanent Magnet Chuck has a built-in power supply of special alloy magnet material. Extremely powerful, yet controlled simply by moving a hand lever, the holding power won't fade with use.

Since a Superpower P-M Chuck has no wires to fail — no current to heat — it's the safest, most economical choice for many jobs. Portable. Versatile. It's ideal for many grinding, light milling, planing, shaping, and benchwork jobs.

A Taft-Peirce Superpower Electromagnetic Chuck gets its power from a DC line. Slightly more powerful, size for size — it throws flux farther, gives greater flux penetration to permit mounting parts well above the face plate.

In addition, it is somewhat more adaptable to unusual holding problems where complex face plate design may be required, involving such elements as special contour, grooving, or slotting.

There are, of course, applications where one does a better job than the other. Since we make them both, we're completely impartial. We'd be glad to advise you which is the best solution to your problem. Write today. (And ask for Catalogs describing the many types and models available.)







Should You Use?





PERMANENT MAGNE

TANGULAR ELECTRO- ADJUSTABLE E

ROTARY ELECTRO-

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#### Wilson"Rockwell"\* **Hardness Testers**

Y MODEL MOTOR-OPERATED

**New Motorized** WILSON "ROCKWELL"\* Hardness Tester with SET-O-MATIC\* Gauge



#### Eliminates Operations... Increases Tests per Hour

DIAL GAUGE Eliminates human error.

SET-O-MATIC\*

Operator merely applies minor load and taps depressor bar. No setting of dial to zero.

#### OTHER FEATURES

- Major load applied under dash pot control
- Major load removed by motor
- Illuminated Dial Gauge
- Illuminated Penetrator

All you have to do with the Model Y wilson "ROCKWELL" Motorized Hardness Tester is apply the minor load and tap the major load depressor bar. The machine does everything else automatically. The cycle of Major Load operation may be less than 2 seconds.

This speed of test means great savings in time which will reduce your hardness testing costs. Yet it is done to Wilson's high standard of accuracy.

The Model Y Motorized WILSON "ROCKWELL" Hardness Tester is in production and orders are being accepted for early delivery. Write today for literature and prices.

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Wilson Mechanical Instrument Division

AMERICAN CHAIN & CABLE

230-6 Park Avenue, New York 17, N. Y.



# Central Coolant System Featured in New Parts Plant

Increased efficiency and higher quality of grinding work are direct results of a central coolant system for all grinding machines in the new Warner & Swasey parts plant at New Philadelphia, Ohio.

A CENTRAL coolant system which supplies continuously filtered coolant to all the plant's grinding machines substantially boosts efficiency and quality of grinding work at the new Warner & Swasey parts plant at New Phil-

adelphia, Ohio. One of the few such systems to be incorporated in new plant design in the country, the coolant operation centers in a below-floor filtering and reservoir installation occupying an area 17 ft. x 34 ft. x 10 ft. high. All of the

plant's grinding machines are



Spent coolant returning from grinders discharges into filtering tanks, where continuous, slow travel of 48-in. wide filtering paper strains out and removes contaminat-ing particles. Fresh coolant is withdrawn from bottom of tank for delivery through pressure piping back tomachines. The two-tank system provides capacity for coolant service to grinding machines, resulting in high operating efficiency and high quality finishes. The level control apparatus, which paces operabridges the tanks at the center.

Pressure piping for fresh coolant delivery and open return trough for spent coolant occupy the same covered channel in the Warner & Swasey system. All of the plant's grinders operate from the common channel.

served by pressure piping from two 2100-gallon filtering tanks in this room. Spent coolant containing work chips and abrasive particles is discharged from the machines into a covered floor channel through which the coolant flows back to the filtering tanks by gravitv.

Spent coolant drops into either or both of the filtering tanks, which incorporate continuous roll feeds of 48-in wide filtering paper to strain the contaminating particles from the fluid. Clear coolant, withdrawn from the bottom of the tanks. is pumped back to the machines at a maximum relief valve setting of 25 pounds per square inch.

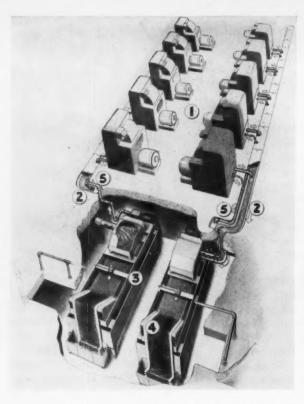
The system is so interlocked that one or all of the three 450 g.p.m. vaned impeller-type pumps may be operated in conjunction with one or both of the filtering tanks in accordance with the number of machines operating. Twenty-eight grinders, varying in size from 4 to 18-in. external to 36 x 60-in. rotary surface units, are presently working in the system, which has an ultimate capacity of 40 machines. Pumping rates and paper feed are regulated by level control switches in the tanks. Used filter paper feeds down into steel bins at the rear of the filter room, where a fenced



opening to the plant above permits periodical removal for disposal by the overhead bridge hoist serving the bay.

This central coolant system offers a number of advantages. It eliminates grinder down time and nonproductive labor necessary for the frequent sump cleaning which would be required by the individual machines, if each were to rely on its own coolant system. It likewise ensures a constant supply of clear coolant of an absolutely controlled mixture for the high work quality and fine finishes required by Warner & Swasey for its machine tools, textile machinery and Gradall construction machine.

With centralized control, coolant waste is virtually eliminated; there is no throw-away involved as otherwise might be the case due to mixtures growing rancid in temporarily idle machines. Finally, the system makes it possible to maintain a



Shown here is a schematic drawing of the modern control central coolant system in use at Warner & Swasey's New Philadelphia (Ohio) Plant: (1) grinders; (2) coolant returns to filter bed; (3) filter bed; (4) filter paper; (5) clean coolant pumped to grinders.

uniform coolant temperature consistently, making it simpler to hold sizes accurately on the machines.

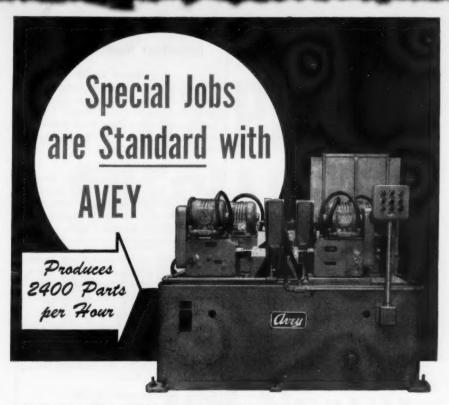
Metals Technology. Edited by Alfred Bornemann. Published by American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. 109 pages. Illustrated. Bound in strong blue cover stock. Price, \$3.00.

Prepared under the auspices of the American Society for Metals Committee on Vocational Education, this book goes right to the points of interest for vocational and technical high school teachers, whose science students will benefit from a fundamental under-

standing of metals and their behavior. This teaching guide is the result of over 10 years of effort on the part of many engineers and scientists to organize a comprehensive guide for teachers in the vocational field. The volume contains detailed laboratory exercises and experiments on 24 different operations. There are four sections to the book: Part 1. "An Introduction to the Science of Metals Technology"; Part 2, "Twenty-Four Labora-

tory Exercises"; Part 3, "Classifications of Metals and Alloys"; and Part 4, "Fourteen Sheets Containing Classification, Selection, Standards, Properties and Micrographs."

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.



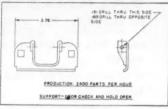
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S. O. No. 17893-Consists of two pairs of No. 1 Avey Cam Feed Units mounted horizontally and opposed on a well designed fabricated steel base. Each pair of Units can be operated individually or collectively and each pair of Units is arranged with loading chute for magazine feed.

The parts are gravity fed down the chute to the drilling position.

Fixture—At the drilling position they are clamped automatically by an air cylinder which clamps the part on the forward stroke. The cylinder is arranged with a small ejector finger which automatically ejects part which passes into a chute in rear of machine. All clamping pressure is transmitted to the ears with final location in the square holes.

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Cincinnati 1, Ohio



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Write for FREE Comparison Chart, Size and Price List S-1

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September 15-18

National Metal Trades Association, Annual Eastern Management Conference, Sagamore Hotel, Bolton Landing, Lake George, New York. Association headquarters: 12 S. Michigan Ave., Chicago 3, Illinois.

September 21-23

Society for Experimental Stress Analysis, Fall Meeting and Exhibit, Hotel Bellevue-Stratford, Philadelphia. Society headquarters: P. O. Box 168, Cambridge 39, Massachusetts.

September 22

Cutting Tool Manufacturers Association, Fall Meeting, Lochmoor Club, Detroit. Association headquarters: 416 Penobscot Bldg., Detroit 26, Michigan.

September 27-28

Steel Founders' Society of America, Fall Meeting, The Greenbrier, White Sulphur Springs, West Virginia. Society headquarters: 920 Midland Bldg., Cleveland 15, Ohio.

September 27-30

Society of Industrial Packaging and Materials Handling Engineers, Annual Exposition, Competition and Short Course, Coliseum, Chicago. Society headquarters: 20 W. Jackson Blvd., Chicago 4, Illinois.

September 28-October 1

Association of Iron and Steel Engineers, Annual Convention and Biennial Exposition, Public Auditorium, Cleveland. Association headquarters: 1010 Empire Bldg., Pittsburgh 22, Pennsylvania.

#### October 4-6

National Electronics Conference, Inc., Annual Meeting and Exhibit, Hotel Sherman, Chicago. Conference headquarters: 84 E. Randolph St., Chicago 1, Illinois.

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#### On any carbide grinding job...

## Nothing



#### Norton Vitrified Bonded Diamond Wheels

outperform all others of this type. They combine the fast cutting action of resinoid bonded wheels with resistance to grooving approaching that of metal bonded wheels. Great durability is another advantage.

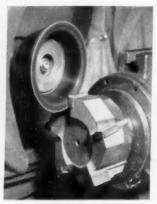


Production Grinding of Single Point Carbide Tools is most economical and efficient with Norton vitrified bonded diamond wheels. Grinding chip breakers, as illustrated, is another important job for which they are



#### Norton Resinoid Bonded Diamond Wheels

combine fast cutting with long, money-saving wheel life that makes them favorites for precision sharpening. Made in two bond types — regular, for wet grinding and B6, for dry grinding. It is always more economical to use each bond type on the applications for which it is best suited.



On Your Multi-Tooth Grinding Jobs, Norton resinoid bonded wheels hold size so that each tooth gets uniform grinding. The straight, thin shapes make excellent cut-off wheels for salvaging damaged carbide tools.

# cuts like a diamond

Diamond wheels in carbide grinding more than pay for themselves. "It's just like finding money."

You can cut grinding time — and grinding costs — to the lowest possible by standardizing on Norton diamond wheels.

As a result of Norton Company's long pioneering† in diamond wheel development, Norton diamond wheels bring you a combination of long service life and efficient cutting action that means maximum economy — across the entire range of carbide grinding applications.

Besides the vitrified and resinoid bonded types shown here, Norton diamond wheels are also available in a metal bond — where durability and resistance to grooving, rather than a fast rate of cut, are primary considerations. For every application the proper size and type of Norton wheels are available in a wide variety of grit sizes. (For small-volume requirements, Norton K Bond CRYSTOLON wheels are often the best investment. See small illustration.)

#### See Your Norton Distributor

for aid in selecting the right Norton wheels for every grinding job. And ask him for the 142-page, illustrated booklet: "Grinding Carbide Tools." Or write to Norton Company, Worcester 6, Mass. Distributors in all principal cities. Listed under "Grinding Wheels" in your classified phone directory. Export: Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.



#### Norton K Bond CRYSTOLON\* Wheels

feature fast, cool cutting and exceptionally uniform performance. The vitrified K Bond permits half-grade increments of hardness, enabling you to "pin-point" your specifications.



For Small-Volume Carbide Grinding, especially in single-point applications, the K Bond wheels offer outstanding economy. Their high stock removal rate and uniform performance assure quality grinding at lowest cost.

W-1580



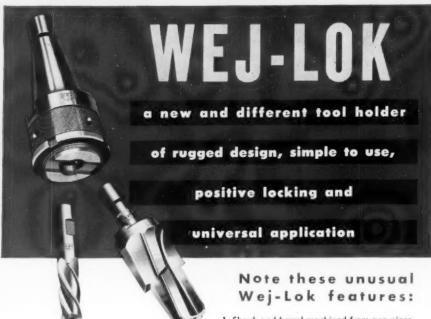
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†First with resinoid bonded, first with metal bonded, first with vitrified bonded diamond wheels.

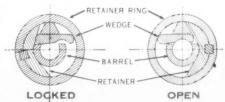


A simple hand spinning of the Wei-Lok retainer ring locks or unlocks inserted tools. Yet, either left or right-hand cutting tools are firmly held by this accurately machined tool holder.

In locked position, the fiat surface of holder wedge is tightly seated in mating notched section of tool shank. Normal operating torque tends to further tighten this wedging action, thus, preventing all possibility of tool play or wobble. Where unusually large tools or extra heavy cutting operations are required, provision is made on the holder for use of a Baker drive to augment wedge locking and assure utmost stability.

Wej-Lok tool holder permits universal usage . . grinding a simple flat area on any tool shank to match holder wedge provides positive locking. You will find Wej-Lok superior in every respect on all drilling, reaming, boring and milling operations.

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- 7. Simple insertion and removal of tools.
- 8. Can be used for right or left-hand cutting tools.
- 9. All tools quickly ground for use in holder.
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#### modern equipment at work

#### Machine Is Tooled to Eliminate Tap Breakage in Machining Transmission Cases

THE two-way tapping machine shown in Fig. 1 is equipped with a new type of adjustable-torque releasing driver, known as the "Safe-Torque," which has virtually eliminated tap breakage problems. Manufactured by Buhr Machine Tool Company, this special machine is designed for

tapping four 5/16-18 and four 7/16-14 Class 2 holes in die-cast aluminum transmission cases. After operating the machine for more than eleven months, the user reports tap breakage is practically non-existent due to the dependable, complete releasing action afforded by means of the new tap drivers.

Manufactured by Scully-Jones and Company, the Safe-Torque Driver has two features which are said to be responsible for its ability to protect taps against breakage normally caused by

hard spots, inadequate cooling or lubrication, dull taps, improper sharpening, and other adverse machining conditions. One feature, a springloaded centering plug (see Fig. 2),

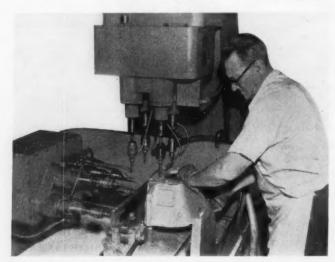
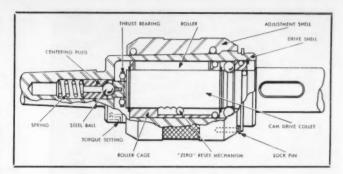


Fig. 1—Special twoway tapping machine equipped with "Sate-Torque" Drivers to eliminate tap break age in machining diecast aluminum transmission cases.

Fig. 2—Sketch showing cross-sectional view of "Safe-Torque" Driver

absorbs shocks when bottoming in blind holes. The cushioning stop and instantaneous release of the driver permit

bottom-tapping at full speed to full depth without breakage. The second feature is the over-running roller drive, which releases completely when torque approaches strength limits of the tap. In releasing, the outside member of the driver revolves around the inner drive-collet members on antifriction ball bearings, thus eliminating friction, heat and wear.



Coolant-Lubricant Important in Tripling Copper Brake Disk Output

INCREASED aircraft brake disk production schedules prompted one Canadian manufacturer to revamp a slow, two-machine setup and replace it with faster operation. Originally, 12 splines, equally spaced about a

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Magni-Focuser multiplies the power of this girl's eyes as she inspects a tiny ball bearing at SKF Industries, Inc.



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regular glasses. Leaves both hands free. Normal

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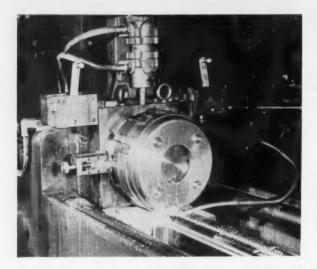
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Three copper aircraft brake plates are broached at one time on this 15-ton 72-in. stroke Colonial horizontal broaching machine. The use of "Shear-Speed" soluble oil eliminated distortion and index errors caused by the heat generated in removing large amounts of metal.

13%-in. diameter, were rough-milled and finish-broached to hold a spline width tolerance of plus 0.000 in. and minus 0.002 in. and a total tolerance of 0.003 in. between any two splines of the workpiece.

The logical solution was a fast, single horizontal broaching machine operation to rough and finish cut the splines in one pass while holding the close tolerances. Engineers of Colonial Tool Company of Canada designed a fixture that utilizes a precision ground index plate and a full umbrella type clamp to hold three parts at a time.

The large amount of metal removed, 3.92 cu. in. per pass, generated so much heat that the disks were being distorted and index errors were appearing. A new coolant-lubricant made

by "Shear-Speed" Chemical Products of Detroit was used, and it was found that the broaches ran so much cooler that all distortion was eliminated and the chips fell away from the cutting edges freely without clogging or piling up.

The production rate is now up to 12 parts per hour, floor-to-floor time. The parts produced with the "Shear-Speed" soluble oil are said to be free from burrs and scores. The machine employed for the job is a Colonial 15-72 Horizontal broaching machine, operating at a speed of 144 strokes per hour.



ATRAX

IN ACTION



A CASE HISTORY: One of our customers had experienced considerable difficulties in boring tapered holes in stainless steel. The specifications called for extremely close diameter and taper tolerances, and a finish requirement of ten micro-inch. The carbide tool previously used gave the customer a production of one piece part, containing eight holes, per eight-hour day. With the new Atrax superior finish ground boring bit, production increased to about five piece parts per day. One tool bit roughed out and finished eight holes before resharpening was necessary, and the finished product was eight micro-inch or better. Atrax Solid Carbide Tool Bits improved production in this instance by over 500%.

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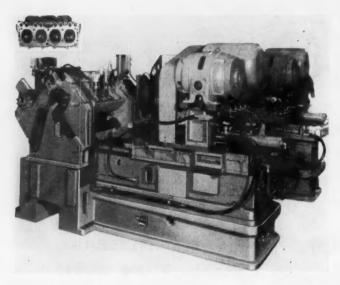


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Overall view of special automatic boring machine that makes possible the holding of concentricity within 0.0005 in., total indicator reading, between valve stem hole and valve seat on a production basis. The machine illustrated was designed for processing V-8 cylinder heads of the type shown in the inset and is equipped with an automatic clamping and transfer mechanism for installation in a continuous machining line.

Machine Finish Bores Cylinder Head Valve Seats and Stem Holes Automatically

A NEW method of specialized tooling developed by W. F. and John Barnes Co., Rockford, Ill., for machining cylinder heads for overhead valve engines utilizes a multi-blade tool for forming the valve seat and a modified gun drilling tool for boring the valve guide holes. This method has been incorporated into an automatic transfer type machine, which, according to performance tests, has

consistently held a concentricity of 0.0005 in. (total

indicator reading) between the valve stem hole and the valve seat.

In addition, tests reveal that the special carbide tools employed will produce 15,000 or more precision valve seats and 2,000 stem holes before tool changes or regrinding is necessary. Gross production of the machine illustrated, now in operation in a large automotive plant, is 120 V-8 type cylinder heads per hour. The machine is designed as a self-contained unit which can be operated individually or installed and connected to an automatic transfer machine line.



## More Production, More Profit BY BROACHING ...

Internal broaching of a cam ring. Note the complexity of the ring design. The steel is soft and tends to tear, yet this Continental Broach sizes the I.D. and cuts 8 splines 5/16" deep in one pass.

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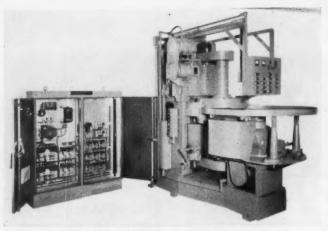
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For facts about increasing your production by broaching, call in your local Ex-Cell-O representative -or write Continental in Detroit for Cutting Tool Cataloa.

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This type of spring grinder, designated as the Besly No. 929 Vertical Spindle Grinder, is currently being used by Delco Products Company to grind the end of springs used in automotive direct action type shock absorb-ers. The machine operates with the grinding cycle entirely automatically controlled. The control electrical mechanism is housed in a separate locker.

#### Grinding the Ends of Shock Absorber Springs

EVERAL spring grinders recently developed by Besly-Welles Corp., Beloit, Wis., are now installed and in operation at Delco Products Co., Dayton, Ohio, where the grinders are reported to have improved grinding quality and considerably reduced abrasive disc wear. The springs processed at Delco are part of automotive direct action type shock absorbers. They vary in wire size from 0.080 to 0.105 in, and each have an inside diameter of 0.586 inch. The ends are ground parallel with a 320degree cleanup and must be square with the axis of the spring within 1/2 degree. Production output is approximately 1,920 springs per hour.

The grinding is performed dry with the entire cycle automatically controlled. In operation, springs are loaded into the slowly rotating feed wheel of the machine until all stations are filled, after which the cycle start button is depressed. The feed wheel goes into rapid rotation and the upper grinding head feeds to the work at a rapid traverse rate, progressing into a controlled feed and sparkout period where final size and squareness are imparted to the springs. At the completion of the sparkout period, the grinding head rises to its upper position and the feed wheel decelerates. At this time the springs are unloaded by gravity and the feed wheel reloaded in readiness for the next cycle.

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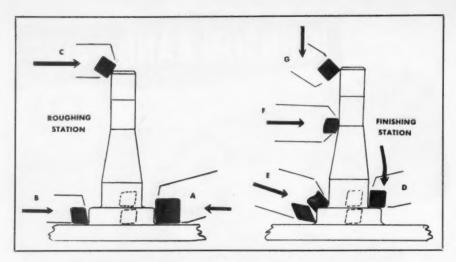
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Drawing showing new tooling setups for roughing and finishing wheel spindles

#### New Tooling Increases Spindle Production 50 Per Cent

IN doubling front wheel spindle production at a large midwestern automotive plant, new multiple tooling has reduced down time and grinding and has eliminated two dual-insert holders while increasing part production from 600 to 1,200 spindles per machine in an eight-hour shift. The front wheel spindles, S.A.E. 5132 with a Brinell hardness of 250-302, are turned on four-station 10-in. vertical Contin-U-matics. The Bullard ma-

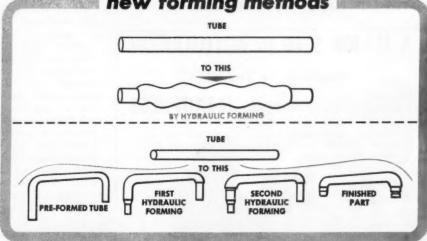
chines are hydraulically operated and are equipped for automatic retraction. The tailstock, which is manually advanced, has an anti-friction center.

In roughing and finishing the spindles with previous tooling, several difficult machining operations were encountered which resulted in excessive down time and grinding. Referring to the accompanying drawing, the new tooling used at the roughing station consists of three Multicut holders. Tool A, with a ¾-in. square carbide insert, faces the spindle flange and turns the large bearing diameter. The facing operation proved to be the



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toughest at this station since the carbide is subjected to severe interrupted cuts. However, one cutting edge produces over 90 pieces with a minimum amount of wear.

Opposing the facing tool A in the roughing station is a finishing tool, B, which finish faces the flange and turns a  $\frac{1}{16}$ -in. radius on the flange end of the bearing diameter. Simultaneously, tool C finishes a  $\frac{1}{16}$ -in. x 45-degree chamfer on the stem end. (With the previous tooling, a dual-insert

holder rough turned the bearing and oil seal diameter while an additional round insert tool rough faced the flange.) The roughing operation is performed at 510 surface feet per minute at 287 r.p.m., with a ½-in. depth of cut.

To eliminate grinding problems in finishing the spindles, a specially designed Wessonmetal insert was applied to holder E at the finishing station which now turns the 0.050-in. radius on the flange end of the bear-

ing diameter. In the same holder. another special Wessonmetal insert turns and forms special radii on the stem end of the bearing diameter. Replacing the previously used dualinsert holder that had 80-degree diamond inserts providing only four cutting edges, a 1/2-in. square insert holder with a 5degree lead angle now finishes the oil seal bearing diameter.

All inserts used at the roughing and finishing stations are indexed after 250 pieces, averaging two complete insert changes per shift. The only exception is the tool A at the roughing station which is subjected to severe interrupted cuts in use.

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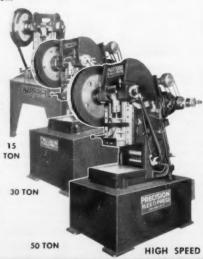
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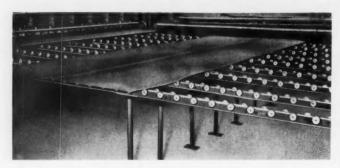


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Alvey Ferguson "Live Rail" wheel-type conveyors used by large eastern manufacturer of pipe to move hardto-handle 16-ft. flat steel sheets from seam welder to form roller

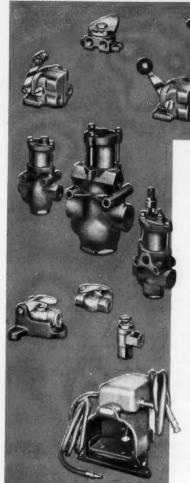
#### "Live-Rail" Conveyors Provide for Easy Handling of Flat Steel Sheets

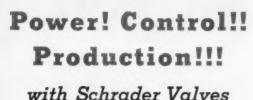
THE problem of moving hard-tohandle single 16-ft. flat steel sheets from the seam welder to the roll former was solved by a large eastern manufacturer of pipe through the installation of Alvey-Ferguson standard S-10 "Live Rail" units in an assembly consisting of nine rows of two units placed end to end. As shown in the accompanying illustration, these ''Live Rail''

wheel-type conveyors are pitched slightly downward, are spaced about 2 ft. apart, and are mounted on center supports made by the pipe manufacturer's shop maintenance staff.

The steel sheets move smoothly by gravity from one operation to the other, semi-automatically. Costly and awkward moving by hand has been eliminated, and an in-process storage bank as well as a live feed-in table to the roll former is provided.







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#### Instrument Inspects Four Dimensions Simultaneously on Automatic Transmission Part

PRODUCTION gaging instrument manufactured by The Sheffield Corp., Dayton 1, Ohio, is used to inspect four dimensions simultaneously on the carrier body of an automatic transmission. In one quick operation, the operator checks the seat chamfer on the inside of the body, outside body diameter, overall body length, and dimensions from the top of the shank to the bottom edge of the upper flange.

Dimensional quality of the part is

Operator is shown checking four dimensions simultaneously on the carrier body of an automatic transmission, using a newly developed production gaging instrument.

indicated by a Master Light and four individual signal lights on the diagram panel. When all of the dimensions are within tolerance, the Master Light remains white and the four signal lights on the panel black out. However, if one or more of the dimensions are out of tolerance, the Master Light turns red and

the signal lights indicate the faulty dimensions by turning either red or green, indicating respectively undersize or oversize. The lights of the correct dimensions black out.

The instrument is equipped with three new small Electrichek gage heads for checking outside dimensions. An Airlectric gage head checks the internal seat chamfer, transferring the variations in air flow to an electric circuit that actuates the red, green or blacked out signal light.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.







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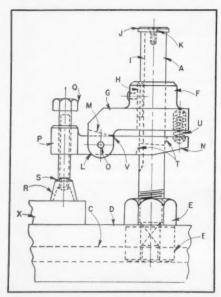
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#### ideas from readers

#### Quick-Acting Machine Table Clamp

By W. M. HALLIDAY England

THE sketch herewith shows a device designed for use where workpieces of varying thickness must be clamped to a machine table. The device includes a hardened and ground cylindrical steel column, A, which is threaded for



Sketch of guick-acting machine table clamp

screwing into the usual T-slot nut, B, located in the T-slot, C, of the machine table, D. The column A is held firmly to the table by means of a lock nut. E. Mounted on the column is a steel block, G, with a boss, F, which is bored to provide a close sliding fit over the column. The block is prevented from rotating on the column by a small T-shaped key, H, fastened in a shallow keyway cut in the bore of the block. This key is arranged to slide freely in a keyway, I, machined along one side of the column. Block G is prevented from passing completely off the upper end of the column by a washer, J, fastened to the top of the column by a V-head screw, K.

The left-hand portion of block G is machined on the underside to form a boss, L, which is centrally slotted for a certain depth, as shown at M. Loosely fitted in this slot is a steel clamping arm, N, which pivots on a pin, O, press fitted through the boss L. The short portion of the arm N to the left of the pivot pin includes a boss, P, which is drilled and tapped vertically for a pressure screw, Q. The lower end of the screw shank is turned to a smaller plain diameter having a clearance fit in a hole drilled in a hollow conical clamping pad, R. The end of the screw is peened over on the inside of the pad in such a manner as to hold the latter in place and yet allow a certain

amount of free movement. The upper end of the pad is curved slightly, as shown at S, for bearing against the square shoulder of the screw in such a way as to permit the pad to swivel a small amount in any direction to align itself with the flat surface of the workpiece, X, regardless of any slight inclination occurring with the setting of the arm N and pressure screw Q.

The opposite end of the arm  $\hat{N}$  is extended for about the same length as block G to the right of the column and

is drilled to provide a close sliding fit over the column. This hole is drilled parallel with the axis of the pressure screw and is relieved at the front and rear ends for slightly more than half the thickness of the arm, as shown at T. These relieved surfaces allow the arm to move radially about the pivot pin O for approximately 1/32 inch. A slight amount of clearance. V. is also afforded between the top of arm N and the underside of block G when these parts are connected together as shown. A light compression spring, U, is interposed between the arm N and block G at the right-hand side of the column

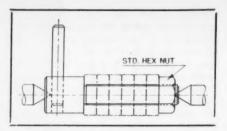
for the purpose of urging the arm away from the block in a clockwise direction and to hold the arm firmly in contact with the column. Thus, the block and arm members can be retained at any height setting on the column before the pressure screw  ${\bf Q}$  is brought to bear on the workpiece on the machine table. The block and arm can be raised or lowered as required by gripping the right-hand ends of these members between the fingers to counteract the pressure of spring  ${\bf U}$ .



#### Simple Turning Arbor for Salvaging Adjusting Nuts

By ROGER ISETTS

FACED with the problem of turning down several thousand adjusting nuts as quickly and as economically as possible, we devised the simple arbor shown in the accompanying sketch. The arbor comprises a round piece of cold rolled steel, turned down



Sketch of simple turning arbor tor salvaging adjusting nuts

and threaded to receive the nuts to be salvaged. The thread was made a Class 1 loose fit so that the parts could be spun on and off the arbor quickly. A pin was pressed in the end of the arbor to act as a driver. The arbor was operated between centers on an engine lathe and, since the lathe spindle turned counterclockwise and the nuts were of the right-hand thread type, the nuts had a tendency to tighten rather than loosen when the cutting tool was in operation.

While the arbor was inexpensive to make, it proved very successful in operation. In addition, the number of pieces salvaged per hour was high since six nuts were turned at one time. This production was increased even more by making another arbor so as to eliminate idle time between turning operations; the operator loaded one arbor while the other arbor was in the machine.





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Famous Strandflex 4 and 5-Speed Gear Drive Machines mean faster speed selection from direct drive head, no countershafts. No changing pulleys or drive belts. No tools needed. Select operating speed with little more than the flick of a finger.

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Full Strand line includes direct drive and countershaft machines up to 3 HP. Also complete line of accessories and tools. Find out today how these versatile production tools can help you boost production without investing in high cost, high maintenance equipment. See your Strand Distributor... or write direct to us for Catalog 331A.

HEAVY DUTY UNITS AVAILABLE! five operating speeds. % or 1 HP motors. Strandflex patented gear head drive. Plenty of power and speed when you want it!



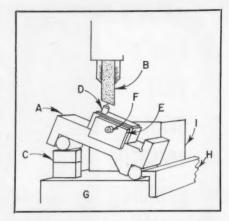
#### Accurate Angle Wheel Dressing Performed with Sine Bar

By FRITZ L. KELLER

MANY shops occasionally have use for an angle wheel dresser; however, the need for such equipment may not be often enough to necessitate the purchase of same. While the sine bar is an accurate device for checking angles, it can also be effectively used for angle dressing in the event a regular angle wheel dresser is not readily available.

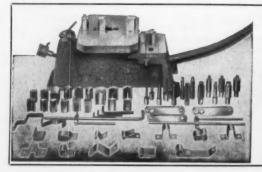
The accompanying sketch shows how a sine bar, A, may be employed in making a temporary setup for dressing a grinding wheel, B, at an angle. For setting the angle to which the wheel is to be dressed, gage blocks, C, are used under one end of the sine bar,





Sketch showing how a grinding wheel can be accurately dressed at an angle using a simple sine bar setup

while a holder, D, containing a diamond is slid along the sine bar by simple hand operation. A side plate, E, attached to the diamond holder by a screw, F, serves as a guide to hold the diamond parallel with the edge of the sine bar. In order to maintain the sine bar at the proper angle to the magnetic chuck, G, the sine bar is positioned against a stop, H, and is also supported by an angle plate, I, to prevent it from moving while the wheel is being dressed. For compound angle dressing, the sine bar setup is simply used in the reverse direction to that mentioned above.



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Write for brochure which illustrates
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#### Unique Gage Simplifies Boring Machine Cutter Adjustment

By T. J. KITTRELL

THE adjustment of boring machine cutters at Temco Aircraft Corporation has been speeded and simplified by means of a unique gage that allows cutters to be set to within

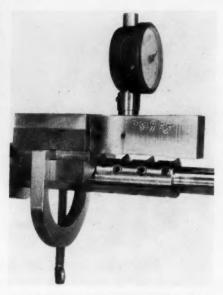


Illustration showing unique gage designed to simplify boring machine cutter adjustment

0.0001 inch of desired position in a few minutes' time. The gage is constructed to adjust cutters to only one setting, and is used only in cases where bore radius is constant for a large volume of work.

The result of an idea suggested by the author, the gage, as shown in the accompanying illustration, is a combination step-dial indicator gage, mounted on a small V-block. A clamp fits in slots on the sides of the V-block and secures the entire  $4\frac{1}{2}$ -in. x  $1\frac{3}{4}$ -in.





#### PORTABLE GRINDERS

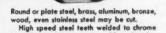
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Sioux high speed teeth hole saws will cut holes from 1/2" to 41/2" diameter in any machinable material.



vanadium body give maximum life and cutting ability. Used in electric drills, drill press, or lathe,

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Durably built of special brushing wire with wide face, even trim, perfect balance. Designed for heavy duty cleaning, removing, deburring, descaling, roughing, buffing, and polishing.

Torque or saucer shaped brushes are fast workers for body repair, removing paint, scale or corrosion, cleaning welded joints, etc, Used with Sioux flexible shafts or portable. tools the broad brushing area cleans large greas in less time.





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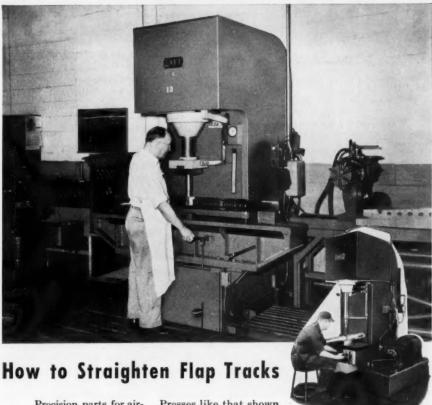
Johnson Gas Appliance Co., E Avenue N.W., Cedar Rapids, Iowa

JOHNSON FURNACES FOR INDUSTRY tool steel device on the bore rod. The stepped part of the gage overhangs the cutters when the gage is secured on the bore rod. Each of the gage's three steps is cut so that it marks the desired radius of sweep for its respective cutter. Cutters are adjusted by set screws so that their tips touch the steps.

For the third cutter—the one that makes the last, deepest and most exacting cut—a 0.005-in. dial indicator gage is used to provide extreme accuracy. The indicator is mounted on top of the step gage and is actuated by a plunger which the cutter tip touches when it is flush against its step. The gage is adjusted so that it reads "0" when cutter adjustment is correct within 0.0001 inch.

For further information on any product mentioned in this issue—use the READER SERV-ICE CARDS between the covers.





Precision parts for aircraft call for the use of precision equipment.

These flap tracks, machined from 4130 steel (aircraft quality), must be checked on a straightening press four times during fabrication. For ease of control and accuracy, the work is done on Dake Gap Type Presses like that shown in the photograph above.

To the right of the ram, the operator has placed a rule gauge which indicates ram travel. Knowing the elasticity of the piece being tested, he can estimate the overtravel necessary to straighten the piece with a single movement of the ram.

Dake Gap Type Press broaches boring bars

Dake Gap Type Presses are available for straightening or forcing, in 22 models ranging up to 300 tons capacity. They are fully described in Bulletin No. 299-sent on request.

Dake Engine Company, 612 Seventh St., Grand Haven, Mich.















#### news of the industry

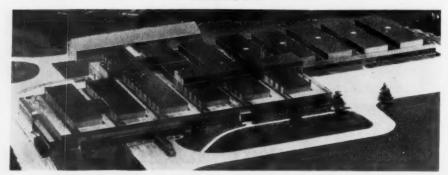
#### Positive Duplication of Grinding Wheels Made Possible by Modern Plant

An important development in the manufacture of grinding wheels has been indicated in the announcement of the completion of a major expansion program by Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio. Hayward A. Gay, vice president of the company and manager of the products division, states that with the addition of new equipment and development of new manufacturing standards, it is now possible to duplicate an original grinding wheel each

time it is reordered. This development is said to have grown out of extensive research into the grinding process and into the manufacture of uniform wheels. Also developed were new standards of manufacture with 36 quality control steps.

Mr. Gay also disclosed that a major addition to the grinding wheel plant has been completed. Located in the addition is a 256-ft. continuous tunnel kiln which was put in operation late in May. Coupled with the existing unit kilns, the tunnel kiln provides greatly increased capacity, and the two types of kilns give an unusual degree of flexibility in the manufacturing process.

Expanded plant of Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati, Ohio



#### Machine Tool Conference of A.I.E.E.

Kenneth MacFarland, education consultant to General Motors, will be the principal speaker at the Machine Tool Conference of the American Institute of Electrical Engineers to be held October 25, 26, and 27 at the Statler Hotel in Detroit, Michigan. According to Kurt Tech, chairman of the A.I.E.E. Sub-Committee on Machine Tools, Mr. MacFarland will

speak at a dinner meeting to be held in the evening of October 25. Many other speakers, prominent in



Kurt Tech

their fields, have been lined up for the conference. Ralph E. Cross. executive vice president, The Cross Company. will talk on "Automation"; Norman Conrad. Ford Motor Company, on "Maintenance of the Automatic Machine"; J. Ducher. General Electric, and H. E. Ankeney, Giddings & Lewis Machine Tool Company, on "Record Play Back Control of a Hydro Skin Mill"; L. P. Randall, Turnstead Division of General Motors, on "Preventative Maintenance Systems"; M. M. Arlin, Arlin Products, Inc., on "Standard Automation and Inspection Equipment"; P. H. Allsbach, General Electric, on "Automation Today"; and J. H. Hosmer, Allis-Chalmers Company, on "Techniques in



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- 1. Superior Sales Engineering Service. CAMPBELL engineers, experienced in every type of cutting problem, are available for consultation on YOUR cutting problems.
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Cuts are smooth and practically burr free.

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WALLE today for Bulletin DH-301 on Campbell Abrasive Cutting Method



enue, Bridgeport Z, Connecticut

Failure Prevention." Dr. Henry Gomberg, assistant director of the University of Michigen Phoenix Project, will speak on "Peacetime Applications of Atomic Energy." In addition, John Brown of Warner Electric Brake, H. B. Spaulings of ITE Circuit Breaker Company, and W. Martin of Vickers Electric Division will present technical papers on electric clutches. Plant visitations to principal Detroit factories are also scheduled.

Eugene Parks Named President of Fonda Gage Sales Corporation

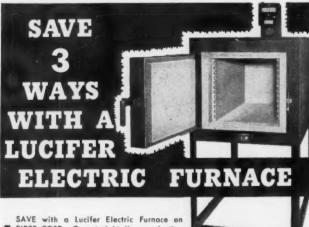
The appointment of Eugene Parks as president has been announced by Fonda Gage Sales Corp., Stamford, Conn. Before joining Fonda Gage Sales, Mr. Parks was associated with the Grotnes Machine Work, Inc., Chicago, Ill., an eastern manager of sales engineering, with headquarters in New York. He began work with the Air Conditioning Division of General

Electric and was promoted to the Marketing Division in charge of sales promotion, publicity, sales engineering and



Eugene Parks

other projects. Mr. Parks resigned to become co-founder of Industrial Production Associates, a marketing organization. He is past president and secretarytreasurer of the New Mexico State Chapter of the A.S.M.E. and is a member of the Sales Executives Club of New York.



FIRST COST. Our straight line production permits economical selling price, despite use of highest quality materials throughout. Check costs on other furnaces . . . feature by feature . . . you'll save money on the Lucifer Electric Furnace EVERY TIME.

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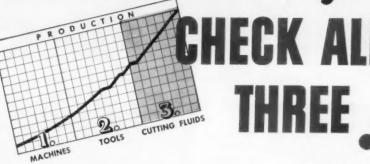
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Several machines in your plant may be capable of performing the job at hand. You may consider two or three machines or even make test runs before deciding which is best. DO YOU ALSO CHECK SEVERAL CUTTING FLUIDS?



#### TOOLS

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Impartial tests of three cutting fluids conducted in the plant of a large auto manufacturer showed and 81.6% for the order of the office of 68.6% of the office of 69.6% for the office of 69.6% for the office of 69.6% for the order two larger highly rated cutting fluids. The proved a rate of the order of

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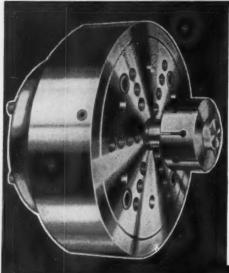
Drawing of new building of Michigan Drill Head Co., Detroit, Michigan

#### Michigan Drill Head Announces Expansion Program

Michigan Drill Head Co., Detroit, Mich., has announced the construction of a new building which will more than double its productive capacity. The new building is designed especially for the building of special production machines and contains the very latest developments in equipment handling machinery. The plant affords a greatly expanded inspection program for precision tooling. The modern building is located in a rapidly developing industrial section adjacent to the Hoover Road area.

#### A. F. Davis Celebrates 40th Anniversary with Lincoln Electric

A. F. Davis, vice president and secretary of The Lincoln Electric Co., Cleveland, Ohio, recently celebrated his 40th anniversary with the com-



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Speedgrip Precision Internal Chucks will save you money on second operation work.

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SPEEDGRIP CHUCK BLKHART, INDIANA

238

pany. Over 250 of his associates wrote him letters which were presented to him by J. F. Lincoln, chairman of the board, in a hand-tooled leather bound book. Nearly 100 of his associates gathered in the evening to honor Mr. Davis with a dinner at which he was presented a desk pen set. Mr. Davis has been vice president of Lincoln since 1925. He has been responsible for the company's educational program which has been important in the last 30 years in the development



I. F. Lincoln (left), chairman of the board of Lincoln Electric, is shown looking at bound book of letters received by A. F. Davis (right), vice president and secretary, on the occasion of his 40th anniversary with the company.

and expansion of the welding industry. One phase of the program has been the publishing and selling of over one million copies of technical books on various aspects of arc welding. Mr. Davis has operated the Lincoln Welding School since 1917 and published, since 1926, the "Stabilizer," a magazine sent to welders all over the world. He is also secretary of The James F. Lincoln Arc Welding Foundation which was created by the company in 1936.

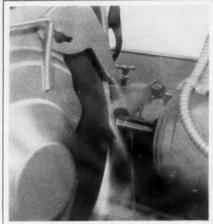


The proof of performance can be shown from a practical demonstration in your plant with your materials and equipment. See for yourself how Milford Hack Saw and Band Saw Blades cut metal with consistent speed, accuracy and economy because of built-in quality that means increased production at lower costs. Take advantage of more than 75 years' experience in the manufacture of quality blades. Contact your nearby Milford distributor or write the factory at New Haven, Connecticut. Factory-trained Field Engineers are ready to give you on-the-job service.

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#### **Positive Duplication**



THE DEVELOPMENT of the new CINCINNATI (PD) Manufacturing Process is one of the most important improvements in grinding wheels in years—a development that will save you money and increase your production.

It means a brighter working picture for you because now, through the CINCINNATI (PD) Manufacturing Process you can be positive that every CINCINNATI (PD) WHEEL you order for a job will be produced exactly to the CINCINNATI grading specified.

Just as a negative guarantees exact duplication of a photograph, the Cincinnati (PD) Manufacturing Process assures a Positive Duplication of the original wheel every time you reorder.

The problem of duplication has been a major concern of Cincinnati Milling throughout its 30 years of practical experience in using grinding wheels, and in supplying industry with precision grinding machines equipped with grinding wheels and ready for production operation. Cincinnati Milling found that once the right grinding wheel had been specified for a particular job, sometimes it was difficult to secure additional wheels of identical grading that would duplicate the performance of the original wheel.

The need for Positive Duplication in the manufacture of grinding wheels is of utmost importance not only to Cincinnati Milling, but to every user of grinding wheels.

Positive Duplication (PD) is the result of extensive manufacturing research which revealed that several steps in the production of grinding wheels generally considered as unimportant, were quite to the contrary, extremely important. As one step toward (PD) WHEELS, Cincinnati Milling constructed the world's most modern grinding wheel plant. Some of the equipment installed has never before been used by the industry in the manufacture of grinding wheels.

Then, to make (PD) Wheels an actuality, Cincinnati Milling developed new standards of manufacture with 36 quality control steps. From the weighing of the grain and bonding material, through molding, drying, firing, finishing, to final inspection, every operation is carried out with the same exactness as in building a precision machine tool.

You're assured a Positive Duplication of the original wheel every time you reorder. "On grade" with a CINCINNATI (PD) WHEEL

means all future (PD) WHEELS will act and grind exactly alike. For you, this means no more production interruptions which cut output and increase your costs.

Let us prove to you how CINCINNATI (PD) WHEELS will make money for you. Just contact us and we'll send one of our representatives—men who know grinding and grinding machines as well as grinding wheels. Write, wire or 'phone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.



CINCINNATI (PD) PRECISION AND SNAGG-ING WHEELS are available in vitrified and resinoid bonds in a complete variety of popular sizes and shapes.



#### Carbide Tool Training Course

A new training course in the use. design and application of cemented carbide tools has been announced by Carbolov Department of General Electric Co., Detroit 32, Mich. Open to all individuals interested in carbide use, the course includes lectures. demonstrations and laboratory sessions covering brazing, design, grinding, chip breakers, rates of operation, interrupted cutting, reamers, trepanning, gun drilling, milling, machinability and tool control. The course will be given nearly every week. In addition, special courses will offer concentrated help to carbide users with unusual problems.

During the past 15 years, 6,300 persons, representing over 1,500 companies, have taken advantage of the Carbolov customer training courses. The new course represents a combination of experience with the most effective teaching materials in the cemented

carbide industry. A new slow-motion film developed by researchers in high speed milling discusses chip formation and flow. Mathematical problems in milling nomenclature have also been added. Both basic and advanced material, formerly offered in two 5-week courses, have been combined in the new course.

#### Newton Company Purchases Machinery of American Tool Works of Hartford, Inc.

The Newton Co., Manchester Conn., has announced the purchase of the machinery and equipment of American Tool Works of Hartford, Incorporated.

As soon as possible, these new facilities will be removed from their present location in Hartford to Newton's plant in Manchester. Many of the former employees of American Tool have been employed on the new-



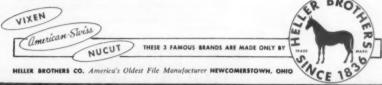


#### HELLER WAS FIRST WITH VIXEN\* MILLED CURVED-TOOTH FILES

Originated by Heller Brothers over 35 years ago, the Vixen still stands as the greatest single improvement ever made in metal finishing files. Each curved-tooth is actually a miniature milling cutter. Vixen cuts faster, freer, finishes smoother. File clears easily even when used on soft, non-ferrous metals or fibrous materials. Famous Vixen is only one of many Heller contributions to better filing. Over a century of continuous inspecting, testing and improving guarantees users of Heller files "the best."

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SPIRAL-CUT Half Round Files
WAYY-TEETN\* Double Cut Mill and Saw Files

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ly acquired facilities. Newton was one of the early arrivals in the electronics industry, and the new addition complements its engineering, research and development activities with facilities for the production of special tools and precision components.

Among the former officers and management of American Tool joining Newton are John Sundkvist, founder, who will act as a consultant; Norman Nelson who will continue as sales manager; and Edward Wild who will continue as superintendent of the production department.

#### T-I Elects New President

Dorothy M. J. Tracey was elected president of the 37-year-old Tomkins-Johnson Co., Jackson, Mich., at a meeting of the board of directors. She succeeds the late A. R. Johnson, her father, who died recently. Mrs. Tra-

cey has served for a number of years as executive vice president and general manager of the firm. Other offi-



Dorothy M. J. Tracey

cers of the company include L. B. Eberhard, secretary: A. M. Miller, treasurer; W. J. Remund. sales manager: and Lee Donnelly, plant manager. The company manufactures air and hydraulic cylinders, air controls, riveters, clinchers, milling cutters and reamers.





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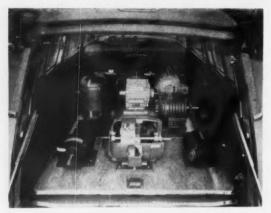


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prospects can view regular production units firsthand, the company has mounted a variety of different product types inside the station wagons, which are currently tour-

Interior view of station wagon of The Lima Electric Motor Company, showing industrial motor and gearshift display

drives. So that customers and

ing the various sales territories throughout the country. After each territory has

been covered, the station wagons will be returned to the factory to be refitted with another group of models, so that there is always something new for the company's customers and prospects to see.

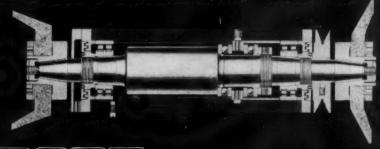
In making the announcement, the

#### Lima Mobile Display Tours the Country

The Lima Electric Motor Company has purchased a fleet of new station wagons fitted out as travelling displays to exhibit the complete line of Lima industrial motors and gearshift



8,760,000,000 REVOLUTIONS



POPE PRECISION SPINDLES

with double row cylindrical roller bearings and ball thrust bearings will still be taking the load — still be producing superior finishes — still be Precision Spindles.

That is why you can

Specify POPE Spindles
with confidence

Send us your specifications and let our engineers recommend the one best Spindle for the job you are going to do.

No. 100

Specify POPE

PRECISION SPINDLES

POPE MACHINERY CORPORATION

Established 1920

261 RIVER STREET . HAVERHILL MASSACHUSETTS

company stated that the displays will travel through every state in the United States. Currently, the mobile displays are traveling through all the states east of the Mississippi River. Companies interested in seeing the Lima electric motor line can write to Richard R. Knierim, sales manager, The Lima Electric Motor Co., 126 Findlay Rd., Lima, Ohio, for information as to when the display unit will be in their area.

Torit Elects W. L. West President

The board of directors of Torit Mfg. Co., St. Paul, Minn., has announced the election of William L. West as president of the company. Mr. West came to Torit after 15 years of association with the Automatic Control Company, also of St. Paul. At Autocon, he served first as treasurer and, for the past eight years, as president. Mr. West succeeds Edward J. Girk, who for quite some time has contem-

plated resignation from the office of president in order that he might devote his time largely to sales promotional





William L. West

activities. Mr. Girk has returned to the office of vice president and sales manager in which capacity he served for 10 years prior to assuming the presidency in 1952. Other officers elected by the board were Lawrence F. Koering. treasurer, and George A. Huna. secretary.



#### the thread of this story depends on . . .

The coils manufactured by the Trane Company, La Crosse, Wisconsin, are the heart of the heating and cooling equipment they produce. Threaded cast iron headers used in many of these coils require cleanly threaded and finished holes that must be absolutely rustfree. Up to 1936, various soluble oils had been tried but none successfully eliminated rusting. On the advice of a Standard Oil lubrication specialist a switch to SUPERLA Soluble Oil was made with marked success. With SUPERLA on the job, rejections due to rusting were compactely eliminated. In addition, the quality of the threads has been superior.

SUPERLA Soluble Oil can help you find a happy solution to your lubrication problem. SUPERLA
REG. U. S. PAT. OFF.
Soluble Oil

For the help and advice of a Standard lubrication specialist call your nearby Standard Oil office or write: Standard Oil Company, 910 South Michigan, Chicago 10, Ill.

STANDARD OIL COMPANY



(Indiana)

#### William Irrgang Elected President of Lincoln Electric

The board of directors of The Lincoln Electric Co., Cleveland, Ohio, recently elected William Irrgang president and general manager of the company. James F. Lincoln, elected chairman of the board, will remain active in the direction of company policies. John C. Lincoln, founder of the company, now living in Pheonix, Arizona, was elected honorary chairman of the



(Left) James F. Lincoln and (right) William Irrgang

board and treasurer. Other officers elected were John S. Roscoe, executive vice president; A. F. Davis, vice president and secretary; and George Landis, vice president.

Mr. Irrgang becomes the third president in the 59-year history of the firm. He has been executive vice president since October, 1951. Born in Germany and a graduate electrical engineer of the State Technical School in Cologne, Mr. Irrgang came to the United States in 1928 and joined Lincoln in 1929. He has been engaged in various phases of plant operation, engineering and management.

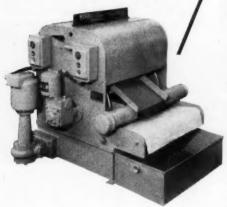


#### Blue M Electric Company Constructs New Building

Marking its fifth expansion in eight years, Blue M Electric Company, Chicago manufacturer of electric ovens,

# PATENTED CUTTING OFF TOOL HOLDERS PATENTED CUTTING OFF BLADES ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY. Manufactured by J. MILTON LUERS. 12 Pine Street, Mt. Clemens, Mich. Produced under License Issued by John Milton Luers Patents Inc.

#### IMPROVED COOLANT FILTRATION



#### .the BARNESDRIL way

Combines Magnetic Separation
with Fabric Filtration

... and CLEAN Coolants Give You

- Improved Finish
- Longer Tool Life
- Increased Production
- Reduced Machine Wear
- Better Sanitation

Now **BARNESDRIL** offers an improved series of Five different sizes of KLEENALL Coolant Filters.

Each has a larger drum... now 15" in diameter which means more magnets and a greater magnetized area in contact with the coolant. Filter fabric is continuously supported through the coolant pool which has been deepened for better flow.

And with all these improvements, KLEENALL Filters still retain their compact design and adaptability to either individual machines or a centralized system.

Find out how KLEENALL Coolant Filters... the only practical combination of magnetic separation and fabric filtration of contaminants can be tailor-made to meet your needs... at less cost and with greater savings for you.

Clip this ad to your company letterhead and mail with your name to us.

Kleenall Filters Are Plant Proven On Our Own Production Equipment

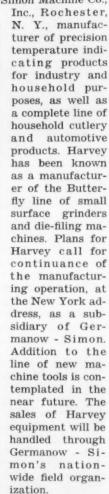


furnaces and related temperature control equipment for laboratories, pilot plants and production, has announced the erection of a new 22,000 sq. ft. onestory building located on a 2-acre plot in Blue Island, Illinois, a Chicago suburb. The modern plant makes liberal use of glass block and stainless steel and is brick wall constructed throughout. A steel-trussed roof, specially designed, allows unobstructed production space. Air conditioned offices and

rest rooms are provided. A unique electrical installation permits testing and operation of a minimum of 137 laboratory units simultaneously.

#### Germanow-Simon Purchases Harvey Manufacturing Corporation

Harvey Mfg. Corp., 161 Grand St., New York, N. Y., has been purchased by the Germanow-Simon Machine Co..





## Why use a Koul-Kradle?

IMPROVED AUTOMATION FOR PUNCH PRESSES, SHEARS, SLITTERS, ROLL FORMERS and all similar machines fabricating from any coiled stock.

benchmaster

Koil-Kradle

with VARI-LOOP Control

KOIL-KRADLE makes available a controlled length of slack loop from which any machine can draw ...shuts off automatically when loop exceeds machine requirements.

KOIL-KRADLE CUTS COSTS! Uses much larger coils; lowers stock costs; eliminates frequent reloading. This means more press time, more production, more profit.

LICKS LOADING PROBLEMS— No heavy lifting, no time-consuming problems...simply roll coil up ramp into cradle position.

SAVES VALUABLE FLOOR SPACE—No need for 8 to 10 feet of wasted space...KOIL-KRADLE butts against any machine it supplies. Compact, occupies only a few feet of floor space itself!

Write for free circular or see your Benchmaster dealer.

benchmaster

World's largest manufacturer of small punch presses and mills.

Benchmaster Manufacturing Co. 1835 W. Rosecrans Ave. Gardena, California

September, 1954

MODERN MACHINE SHOP

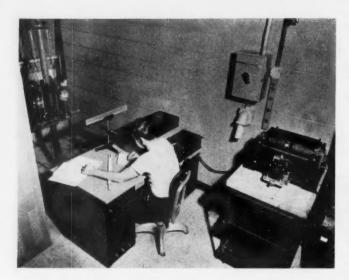
MANY SIZES:

Capacities from V2 ton to

8 tons, coil dias. 36" to 60".

stock widths 10" to 48".

253



Carboloy Opens Lab for Measuring and Analyzing Magnetic Materials

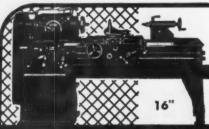
One of the most modern laboratories for measuring and analyzing magnetic materials has been opened by Carboloy Department of General Electric Co., Detroit 32, Mich. The laboratory affords the Department's engineering section every conceivable type of equipment for measuring magnetic fields and enables engineers to check designs, measure performance and efficiency of equipment in which Carboloy products are used, establish standards, calibrate precision magnet-

Operator is shown taking magnetic measurements with a Sanford-Bennett high-H permeameter in Carbolay Department's new magnet laboratory. Sample being tested is shown in center of test circuit on portable table at right.

ic assemblies and evaluate new magnetic materials. The basic objective is to provide magnet users with magnetic field energy in the most effici-

ent manner possible. Circuit arrangement, choice of materials, method of magnetizing and stabilizing all influence the solution, and measurements are the key to decision.

The laboratory is also the hub of activities for the company's permanent magnet manufacturing plant in Edmore, Michigan, and the development foundry in Detroit. Customer requirements are analyzed in the laboratory and expressed to the factory in terms of manufacturing instructions. Installations required to do this engineering work include magnetizing and demagnetizing equipment, stabilized



#### CARROLL AND JAMIESON LATHES

 This 16" lathe is equipped with 12 speed geared head, motor drive, and Timken mounted spindle. It's modern in design — with liberal dimensions.

Write today for descriptive bulletin 39-A-10.

THE CARROLL & JAMIESON MACHINE TOOL CO. . #1550 WIGH



38 YEARS EXPERIENCE

#### RECLINABLE POWER PRESSES



Ideal for general stamping work . . . 4 to 100 tons capacity. Can recline to 40° with perfect safety.

Our catalog contains a wide variety of press types and sizes. Write for it today.

year serving worldwide industry with Patent Percussion, Open Back, Double Crank, Punch, Horn, Toggle and Straight Side Presses, Dial and Roll Feeds.

#### ZEH & HAHNEMANN CO.

190 VANDERPOOL ST.

NEWARK 5, N. J.

### NIBBLING MACHINES



CAPACITIES UP TO 3/4"

ASK FOR FREE BULLETIN ......

"NIBBLE YOUR COSTS"

FOR TUBE SLOTTING, TUBE SHAPING AND FAST AND ACCURATE CUTTING OF FLAT SHEETS BY TEMPLATE OR TO A SCRIBED LINE

W. J. SAVAGE COMPANY Knoxville Since 1885 Tennessee

PIONEER MFRS. OF NIBBLING MACHINES

power supplies, basic machine tools to allow construction of magnetic circuit components, automatic equipment for recording hysteresis loops and facilities for developing high speed test equipment for production line use. Complete facilities are available for metal work, wood working and electric circuitry. In addition to a full set of hand tools, a band saw, lathe and drill press are at hand.

Among the laboratory's major installations is a recording hysteresigraph which automatically makes a complete and accurate record of a magnet's entire hysteresis loop. Any or all parts of the major or minor loops can be explored at will by the operator. Another important instrument is a 3000-volt capacitor discharge impulse magnetizer for magnetizing odd-shaped single large magnets or magnetic assemblies.

The laboratory's power is furnished by a separate sub-station containing special motor-generator sets and rectifiers for controlled direct current and alternating current and varied frequencies. Much of the electrical equipment generates heat that must be kept under control, so cooling water is available at a number of outlets. One section of the laboratory is reserved for experiments with Thermistors. Facilities here include a controlled temperature oil bath equipped with both heating and refrigeration units.

#### Wilton Tool Breaks Ground for New \$500,000 Plant

In a ceremony attended by company officers, contractors and city officials, Wilton Tool Mfg. Co., Inc., Chicago, recently broke ground for a new general office and factory building located at 9525 Irving Park Road, Schiller Park, Illinois. According to company officials, the expansion program is expected to cost approximately half a million dollars. Roughly 65,000 sq.

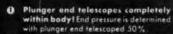
## VLIER Ready-Made Spring Plungers

Eliminate Costly,
Custom-Made Devices

Provide accurate, pre-set end pressures for every need!

Why wasse coolenater's time machining make-shift devices to provide necessary spring loads? Standardizing on low-cost ready-made Viter Spring Plungers speeds Jig and fixture manufacture and insures accurate, uniform loading, resulting in more accurate machining, fewer rejected parts!

40 TYPES AND SIZESI Hundreds of thousands of Vlier Spring Phagers are now in use positioning parts in dies, ligs, and Satures, as detents, locating pins, and die efectors. wherever accurately-controlled, constant spring pressure is needed! Order a soide assortment of types and sizes from your Vlier distributor testant.



Case-hardened plunger end gives high wear resistance! Ductile core overcomes brittleness, reduces hazard of failure under impact common with hardened, high-carbon steel.



- Large bearing surface assures perfect alignment at any part of plunger travel; eliminates binding and reduces wear!
- Rust-proof finish prevents freezing in the fixture!

Sill lo

Standard Nose — Cylindrical plunger end is accurately radiused to speed loading and unloading of jig or fixture. End pressures available from 32 to 42#; various diameters and lengths.

Silvernase — Cadmium-plated plunaer ends identify light ( $1 \pm 6.7 \pm 9$ ) and pressures. Special spring design developed for fast, repetitive operations; give millions of flexes without fatigue failurel

Hexnose—Plunger end is hexagonal-shaped. Can be easily and quickly installed, adjusted, or removed with an ordinary end wrench! End pressures available from 8± to 12± in Standard type, and from 2½± to 6± in Silvernose type; various diameters and lengths.

Plastic Nose — For use with aluminum, bross, and other soft, easily marred materials. Plastic plunger and reinforced for less deformation under loading. Excellent wear resistance; high dielectric strength. End pressures available from 5# to 18# in Standard type, and 1½# to 7# in Silvernose type, various diameters and lengths.



VLIER

105 ANGELES 4 CALIFORNIA



Viler Screwball Clamps — Overcome angular irregularities in clamping setups. Prevent surface damage. 17 sizes!



Vlier Key Klips
— Eliminate lost
hex keys! Speed
positioning of
part in fixture.
3 sizes!



Viler Torque Thumb Screws — Apply accurate, controlled end pressures to the workpiece. 4 models: 19 sizes!



Viler Spring Steps—For use where there are no wall sections in fixture. Two models: 14 and 32 lbs. end pressure.



Vlier Toggle
Pads — Assure
clamping of
parts with irregular surfaces. 5
sizes: fer use
with standard
screws, toggle
clamps and pliers.



Viler Fixture
Keys - New 5Way Key fits all
common mill
table slots. 3Way model also
available.



(Left to right) H. G. Johnstin, metallurgical engineer; Dr. George A. Roberts, vice president in charge of technology; H. A. Stewart, member of the board; and R. B. George, vice president in charge of sales, all of Vanadium-Alloys Steel Co., Latrobe, Pennsylvania

ft. of floor space will be included in the single-story main building. The structure will incorporate the latest features of modern industrial architecture and will be located on a 5-acre tract with ample parking facilities and an attractive setting. Offices will be in front of the building, and the factory space will be adjacent to a railroad siding. Wilton Tool manufactures a line of manual and automatic vises, work positioners and C-clamps.

The plant has been in production since April of this year. According to J. P. Gill, president of Vasco Canada, as

Vasco Canada Holds Open House

well as the American parent company, Vanadium-Alloys Steel Co., Latrobe, Pa., the firm has expended approximately two million dollars to prepare the plant for efficient operations. Improvement and modernization of the plant during the past 18 months and installation of new equipment has been carried out under the direct supervision of L. D. Bowman, vice president in charge of operations for the Canadian company and the parent firm. Mr. Gill and Mr. Bowman also serve on the board of directors for the Canadian company.

Officials of Vanadium-Alloys Steel, Canada, Ltd., marked the opening of the firm's London, Ontario, plant recently with an informal open house party, highlighted by conducted tours of the plant, for more than 200 Canadian and American industrial leaders. In conjunction with the formal opening, officials have announced that there will be ample stocking of tool steels at the plant, as well as at the company's large new Toronto warehouse and the warehouse under construction in Montreal. The assignment of distributors in other Cana-

#### FOR MOST LATHES TO 1" BAR STOCK CAPACITY . .

#### STEP UP PRODUCTION 20% +

- Hold delicate parts without damage or adjustment
- Iron grip for heavy work
- No adjusting for stock or part variations
- Finger-tip or foot control eliminates operator fatigue
- Eliminates jarring of head stock (Ten-day FREE TRIAL to reliable firms)

#### WILSON AIR COLLET CLOSER, INC.

909 40th Avenue NE

Minneapolis, Minnesota





ROCKFORD CLUTCHES provide the advantages of heat-treated, hardened and ground steels—flat, non-grab facings—heat dissipation—dirt exclusion—and fine adjustments. These wear-resisting, life-lengthing clutch features are essential to designs that must be projected with a thought to uses of tomorrow. ROCKFORD engineers now are working with many companies on their future designs—to provide custom-engineered clutches for long range economy. Their services are available to you.

#### Send for This Handy Bulletin

Shows typical installations of ROCKFORD



CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes



capacity tables, dimensions and complete specifications.

#### ROCKFORD CLUTCH DIVISION

BORG-WARNER

300 Catherine Street, Rockford, Illinois

## ROCKFORD



View of new press assembly department of E. W. Bliss Co., Canton, Ohio

dian industrial centers has also been undertaken by the company, and the parent firm in Latrobe has agreed to make available its metallurgical research and manufacturing techniques, as well as the services of its experienced personnel.

#### Bliss Opens New Press Assembly Department

The opening of a new press assembly department, which is expected to

add 20 presses to the monthly shipments when full production is attained, has been announced by Lloyd Jones, assistant plant manager of the E. W. Bliss Co., Canton, Ohio. Mr. Jones pointed out that the increased production at the Canton plant will shorten deliveries and at the same time provide better service to customers on repairs and replacement parts. As part of the expanded press building program, the enlarged capacity was added through the consolidation of government contract work. Mr. Jones

emphasized, however, that when the national defense effort dictates, defense orders naturally take precedence over press building operation. Moreover, he stated, with the new department, full utilization of plant facilities for defense purposes can be made with a minimum of lost time. E. W. Bliss Company is one of the world's largest builders of mechanical and hydraulic presses and a leading supplier of rolling mills and allied equipment.



### for speedy drilling OF COTTER PIN HOLES IN SCREWS, BOLTS, ETC. The KENT Duplex DRILLER

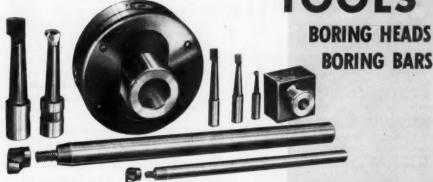
Two drills move toward the center. One drill then withdraws and the other completes the hole. Parts can be drilled and countersunk at the same operation. Semi-automatic or full automatic feed. Write for illustrated descriptive literature.

#### The KENT MACHINE CO., Cuyahoga Falls, O.

Drillers - Threaders - Slotters - Countersinkers - Bar Pointers

for more Accurate cuts...
greater Rigidity in

BORING



## Use CRITERION BORING EQUIPMENT

#### BORING PROBLEMS? CLOSE TOLERANCE?

Try Criterion Boring Tools. Built with the same care and quality as the time-tested Criterion Boring Head.

#### THIS COMBINATION WILL PRODUCE RESULTS.

Boring heads from 1½ to 7 inch diameter. Boring tools, carbide or high speed steel, % to 1¾ inches diameter. Bore holes from ½ to 20 inch diameter.

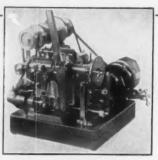
Accuracy for the closest tolerance • Rigidity for the heavy cuts • Heat-treated parts for long wear

#### LARGE OFFSET SAVES TIME AND TOOL CHANGES

CRITERION MACHINE WORKS These tools will cut your boring costs.

See the complete line of CRITERION TOOL PRODUCTS at your local dealers or write for free catalog.

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#### WALTHAM

**Pinion and Gear Cutting Machines** 

with revolving cutter will make 1, 2 or 3 successive cuts for watch pinions or may be used for fine pitch gears up to  $1V_2^{\rm op}$  dia. Blanks are held and indexed by work spindle and usually supported by a tail center. Only straight teeth can be cut.

#### WALTHAM MACHINE WORKS, INC.

Pinion and Gear Cutting Machine, Thread Milling Machine, Cylindrical Sub-Presses, Cutter Sharpening Machine, Small thread milling and gear cutters, Small special machinery.

### Why Use A Shaper to cut Keyways when a

DAVIS KEYSEATER

do the job so much quicker and better?

Send for Circular



#### DAVIS KEYSEATER CO.

Exchange and Glasgow Sts. ROCHESTER, N. Y.

#### Potter & Johnston Acquires Newark Gear

Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford, Conn., has announced that its subsidiary. Potter & Johnston Co., Pawtucket, R. I., has taken over the manufacture of products formerly made by Newark Gear, Inc., Newark, N. J. The products now being made by P&J include gear hobbing machines, gear cutting machines, gear testing machines, gear cutter grinding machines and attachments for the machines. Sales and service for Newark Gear machines will be handled by the Pratt & Whitney Sales Division through its branch offices and its main office in West Hartford.

For further information on any product mentioned in this issue—use the READER SERV-ICE CARDS between the covers.



"As a former basketball player I don't really have much mechanical experience, but I'm a whiz at replacing burned-out light bulbs."

### ABRASIVE-BELT MACHINES

(Now Made and Sold by Engelberg)

## Do More Surfacing Jobs FASTER and BETTER

Features high speed cutting by millions of abrasive points imbedded in a continuous belt, cooled and cleaned by water and other coolants. Does close tolerance work on flats, squaring, cylindrical surfacing; deburrs, knocks off corners, forms radii, bevels and other operations. Often does milling, shaping, grinding operations 10 times faster—saves 75-90% set-up time.



#### PLATEN OR FREE BELT

Model B-6W. Quickly adaptable to flat, curved or irregular pieces. Various shaped platens form the flexible abrasive belt to fit many shapes of work. Free belt reaches inaccessible spots.



#### CONTOUR GRINDER

Model C-6. For curved or flat-face grinding or polishing. Flexible abrasive belt runs over shaped contact roll. Loaded abrasive wheel no longer necessary. Wide-range adjustments easy for varied work. Saves set-up time and reworking of piece.



#### FINAL FINISH

Model WG-4. For production runs on small parts, fed freehand or by simplest fixtures. Gives final finish to jobs done on automatics, hand and hacksaws, lathes, milling machines, etc. Grinds carbide tipped tools.





#### BG8/FT9 Grinds Casting

Problem: Machine two rim surfaces of aluminum oil burner casting with single set-up.
Solution: Model BG8/FT9 with indexing fixture.
Both sides are ground without moving the piece.
Net grinding time for two surfaces: 15 seconds.
This was 100% faster than former milling time.
In spite of rapid stock removal there was no distortion.

#### . FREE SAMPLE GRINDING

We will prove Abrasive-Belt Machining can cut your costs. Send samples for recommendations and actual test grinding. No obligation.

| The ENGELBERG Huller Co., Inc<br>109 Seneca St., Syracuse, N. Y. |  |
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| Send case history booklet and name of<br>nearest distributor.    |  |
| Name   |  |
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| Сотрану  |  |
| Company  |  |



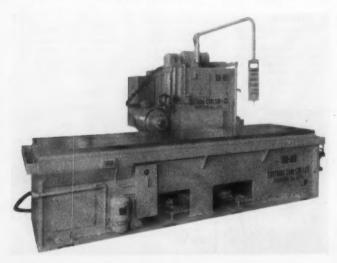
#### Scarf and Edge Milling Machine Is Intended for Use in Non-Ferrous Metals

Identified as the No. SM-100, an open-side scarf and edge milling machine which is primarily intended for use in non-ferrous metals has been announced by Ekstrom, Carlson & Co., 1400 Railroad Ave., Dept. M-14, Rockford, Ill. Mounted on a vertical column, the machine's horizontal spindle head can be adjusted to tilt a maximum of 30 degrees either above

or below the center line. The spindle head is driven by a 15-30 h.p., 1,800-3,600 r.p.m. motor and is equipped with a No. 50 standard milling machine taper. A large work table surface measures 36 x 144 in., is furnished with three standard T-slots and provides a 36-in. working height from the floor to the table top.

Traveling on one vee and one flat way, the vertical column incorporates a variable feed rate ranging from 10 to 200 in., as well as jog-dynamic braking and rapid traverse. Both the

work table and the herringbone pinion rack are designed so that they can be extended at one or both ends, if necessary. The machine is furnished complete with pendant control embodying pushbutton controls for spindle head



Ekstrom, Carlson No. SM-100 Scarf and Edge Milling Machine

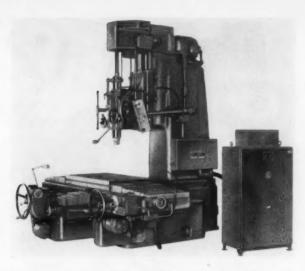
motor start and stop, rapid traverse of the column to either right or left and a variable speed rheostat.

#### Jig Borer Locates, Bores, Mills and Checks

Designated as the 3E "Electrolimit," a 13-ton jig borer which is designed for precision locating, boring, mill-

ing and checking has been announced by Pratt & Whitney, Division Niles-Bement-Pond Co., 25 Charter Oak Blvd., West Hartford 1, Conn. According to the manufacturer, ample working space is provided by a 28 x 56-in. table, and travel is 48 in. longitudinally and 28 in. transversely. Maximum height between table and spindle end is 30 inches. Columns 6, 10 or 14 in. higher than standard can be furnished, increasing the machine capacity accordingly. The machine has electronically controlled milling feeds infinitely variable from 1 to 15 in. per minute. Rapid power travel of 60 in. per minute is also provided. There are eight selective spindle feeds ranging from 0.0005 to 0.015 in. per spindle revolution, both up or down, and 12 spindle speeds ranging from 30 to 1,500 r.p.m. are provided through a gearbox and four-speed motor.

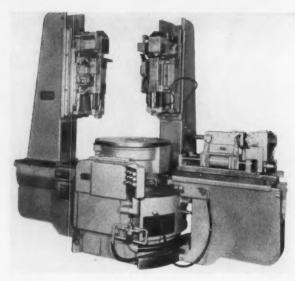
Two separate Electrolimit measuring units are employed, one for longitudinal and the other for transverse movements. Both measuring units are independent of traversing screws. Each unit obtains basic 1-in. spacings electromagnetically from a solid



notched master bar and registers a zero reading on an indicating meter without making physical contact. Fractional inches are obtained by moving an electromagnetic head by means of a super-precision micrometer graduated for easy reading to 0.0001 inch. A precision preloaded ball roll quill "roll-feeds" on 360 precision balls preloaded between the hardened quill and liner with a total bearing pressure of 8,000 pounds. The head bore is provided with a hardened and ground steel liner, deep frozen for assembly and precision lapped in place. Other features included in the 3E Jig Borer are centralized control, with push-button control box adjustable for height; open side design for handling large workpieces; precision hand scraped bearing surfaces; automatic pressure lubrication; telescoping guards on all bed ways; and separate motor control cabinet.

#### Universal Drilling Machine

The Hartford Special Machinery Co., Hartford 12, Conn., has anounced a universal drilling machine which is



to 192 indexes. The capacity of the machine ranges from 87-in. diameter work with 65-in. bolt circle diameter down to 30-in. diameter work with 8-in. diameter bolt circle.

#### Grinding Coolant Can Be Put Right into Water in Grinder

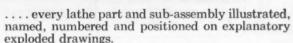
The Motch & Merryweather Machinery Co., Cutting Tool Mfg. Divi-

sion, 1250 E. 222nd St., Cleveland 17, Ohio, has announce the "Triple C" Grinding Coolant, for all wet grinding operations, which may be put directly into the water in the grinder where dissolving can take place quickly. According to the manufacturer, the coolant is compatible with heattreating salts, makes stable solutions, maintains properties in even the hardest water and does not impair filtration equipment operation. It is also claimed to be foamless, odorless, transparent and does not make ground materials slippery to handle when wet. Triple C is said to dissipate heat quickly, and the solutions have no emulsifying action on oils or any deterrent effect on lubricated parts of machines. The grinding wheel, it is claimed, stays clean and free-cutting, and chips are flushed and grinding dust settles quickly. Disposal presents no problems as the solution may be thrown directly into sewers or streams without the hazard of contamination. Triple C is available in 9 and 50-lb. pails or in 150-lb. steel drums.

designed to provide a standardized basic machine accurate enough for aircraft parts and rigid enough to hold tolerances in heavy work. The fully automatic machine, it is claimed, accommodates up to four drilling or tapping units, all of which are quickly adjustable radially, vertically and circumferentially. According to the manufacturer, the adjustable drilling or tapping units and easily changeable cams for programming control allows quick conversion to meet engineering changes and the obsolescence of parts.

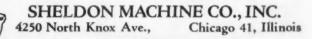
The rugged machine, weighing 17,-800 lb., incorporates air-hydraulic heads which will drill up to ¾-in. holes in mild steel and ½-in. holes in stainless steel, with interchangeable index plates for equal or unequal hole patterns. Spindle speeds range from 180 to 6,700 r.p.m., and feed ranges from ½ to 40 in. per minute. The machine is said to be quickly adjustable for all factors of standard 96 notch or other index plates or for intermittent or irregular spacing. Special index setups are available to allow up





.... a section which illustrates and describes each of over 50 modern Attachments and Accessories to make your Sheldon Lathe even more versatile, productive and valuable to you.

To get this valuable Parts List (and Accessory) Manual just write (1) the serial number of your Sheldon Lathe and (2) your name, and (3) your firm name and address, on a post card, letterhead, billhead or slip of paper and mail it to "Parts Manual".



HILLY II SURFIRE

Note: Serial numbers are found between the front ways,

at right end of

### SUPEREAM

### THE ONLY DECIMAL REAMER

with all FLUTES ground Face and Back After Heat Treatment...

#### **PREVENTING**

CLOGGING or FREEZING of CHIPS for REMARKABLE

#### SMOOTH REAMING

All diameters are held to plus .0002 and minus .000 for close sizing. Size markings are stamped half-way up on shanks so they cannot be obliterated by drill press chucks.

#### TROSE CHUCKING REAMERS

Available in the above four styles on request. Designate by "R" in front of style desired.

\* In Emergency PHONE Libertyville 2-4200.

No. 700 Straight Flute

30° Left Hand Spiral No. 740 7° Right Hand Spiral

No. 730

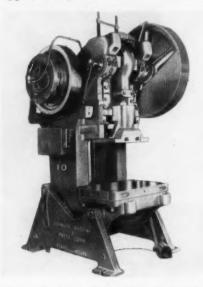
No. 720 7° Left Hand 7° I Spiral

#### TWENTIETH CENTURY MANUFACTURING CO.

ROUTE 176 and BRADLEY ROAD BOX 429M, LIBERTYVILLE, ILL.

#### Power Press Has 116-Ton Capacity

Identified as the Model 10, a 116-ton capacity open back inclinable power press which is said to be dimensioned and powered to afford a wide range of usefulness has been announced by Johnson Machine & Press Corp., 620 W. Indiana Ave., Elkhart, Ind. Available in flywheel or bull gear types, the press features a Wichita



Johnson Model 10 116-Ton Open Back Inclinable Power Press

air clutch and an air actuated spring set brake. The machine has a 4-in. stroke and a  $17\frac{1}{2}$ -in. die space. Up to an 8-in. stroke may be ordered as a special, and additional die space from  $17\frac{1}{2}$  to  $22\frac{1}{2}$  in. is also available. The flange ram face is 25 in. wide x 17 in. deep. Two inches of additional die space is afforded by using a  $20\frac{1}{2}$  x 15-in. ram without a flange. The bed area of the press is  $40\frac{1}{2}$  x 28 in., with a  $20\frac{1}{2}$ -in. opening in the back.

The flywheel model machine has a speed of 68 strokes per minute, and

No. 720

Ne. 730

No. 740

268

Announcing...

## **ATKINS**

Silver Steel

PRECISION GROUND FLAT STOCK

Oil Hardening Tool Steel

- Now available in all Standard Sizes
  - Call your ATKINS
     Distributor



ATKINS SAW DIVISION
BORG-WARNER CORPORATION
Indianapolis 9, Indiana



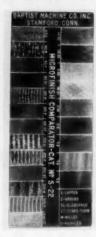
the back geared style has a speed of 40 strokes per minute. Each model has 110-volt controls for stop at the top, emergency stop, jog and single or continuous operation.

#### Surface Roughness Scale

Baptist Machine Co., Inc., 703 Pacific St., Stamford, Conn., has announced a surface roughness scale, designated as the S-22 Microfinish Com-

parator, illustrating 22 typical machined flat surfaces capable of being produced by various methods of machining and having roughness height values from 2 to 500 microinches. These surfaces are in accordance with Part 2 of American Standard Physical Specimens of Surface Roughness and Lay which describes surface roughness specimens for visual and tactual comparison. The scale is made by electroforming, a method which is

said to provide absolute reproduction of a pattern having intricate detail. The comparator provides an economi-



Baptist S-22 Microfinish Comparator

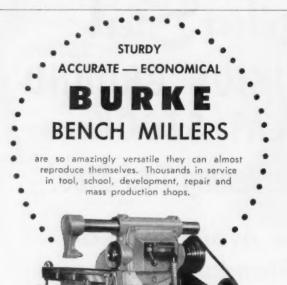
Also available

in hand-feed

and universal

models.

cal tool which permits roughness to be specified and controlled in accordance with adopted standards on the same basis as linear measurements.



Send for complete data on models, specifications and accessories.

#### THE U. S. BURKE MACHINE TOOL DIV.

Brotherton Road 3, Cincinnati 27, Ohio

Burke No. 4

Power Feed Model

When every minute counts . . .

Bay State Taps produce threads of the utmost precision with a maximum of productivity.

This dual quality of Bay State Taps . . . precision performance . . . is readily available from nearby shelves of industrial supply distributors.



BAY STATE TAPS

BAY STATE TAP & DIE COMPANY

MANSFIELD, MASS.

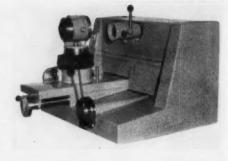
September, 1954

MODERN MACHINE SHOP

271

#### Machine Handles Practically All Tool and Cutter Grinding Requirements

Designed for cutter grinding only, the Sterling Model RK-2 Tool and Cutter Grinder which will handle practically all the tool and cutter grinding requirements in the average shop has been announced by McDonough Mfg. Co., 1521 Galloway St., Eau Claire, Wis. On the Model RK-2 machine, the work remains stationary



Sterling Model RK-2 Tool and Cutter Grinder

A Real Spring Winder!



Will earn its cost in one day. The Hjorth Perfection Spring Winder offers the

ideal means of winding extension, compression, torsion, taper, double taper, or left hand springs. Try one in your shop. You'll

like it and the price is reasonable.

No. 1 Capacity O thru 3/32" wire \$1.50

No. 2 Capacity O thru 3/16" wire \$3.00

No. 3 Capacity O thru 5/16" wire \$5.00

HJORTH LATHE & TOOL CO. 10 BEACON STREET

WOBURN, MASS.



Gaymark No. 41 Magnetic Chuck

**Parallels** 7/8 x 2 x 4

\$29.95

PER PAIR

- Silver Brazed
- Reinforced With 2 Steel Rods
- Precision Ground to .0001 Parallelism
- Adjacent Sides Ground At Right Angles Individually Priced At \$17.50 ea.

Immediate Delivery Shipped Open Account For Your Approval Available in All Sizes Your Inquiries Invited

Gaymark Machine Tool Co., Inc.

12 CHURCHILL AVENUE WHITMAN, MASS. TEL. WHITMAN 462

and the grinding wheel moves, thus eliminating the usual tables and making possible a compact machine with all controls grouped within easy reach of the operator. With everything open and accessible, setups are said to be easy to make. The grinding wheel spindle floats on anti-friction bearings which are totally enclosed.

Standard equipment includes workhead, centers and universal vise. Optional equipment available includes collet attachment, form cutter grinding fixture, indexing head and radius grinding fixture. The machine is said to be capable of handling cutters up to 14 in. in diameter, and the grinding wheel has a travel of 10 inches.

#### Micro-Drills for Small Holes

Louis Levin & Son, Inc., 3610 S. Broadway, Los Angeles 7, Calif., is

#### LAST!

A Low-Priced Dial Type Indicator Has 2 contacts 1/32" threaded within 1/2". Double Faced. Reads front and back. Two Crystals. Double faced dial indicator complete with plated holder includ-ing 1/32" and 1/8" contacts —

Black Pentrate ....\$6.95 Satin Chrome .... No. 4 Superior Magnetic Base and Indicator Holder...\$8.95

SUPERIOR INDICATOR CO. P.O. Box 734, Rochester 3, N. Y.





## EMPIRE FLOATING REAMER HOLDERS EMPIRE FLOATING TAP HOLDERS

And we do mean float! These floating reamer and tap holders compensate for both out-of-parallel and angular misalignment and permit tap or reamer to float freely—in and out—and will not freeze under tension caused by drag.

By referring to the drawing you will note that the sleeve and shank float independently of each other achieving a free and easy movement—a unique engineering design not found in any other floating tool.

With the Empire Floating Tool Holder you'll have no more bell mouths or over-sized holes. Holes can be reamed to close tolerances.

#### Ask about the Floating-Releasing Tap Holder

- that corrects for both parallel and angular misalignment
- that will not strip threads when tap is pulled out
- -that permits adjustments of float to threading right or left hand.

8774 GRINNELL AVE.



**DETROIT 13, MICHIGAN** 

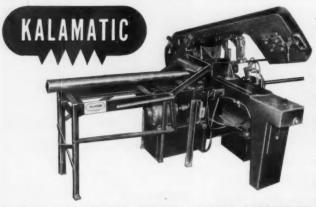
now distributing the Sphinx line of precision drills which are being stocked in sizes starting with 0.08 mm. (0.003 in.) in 0.01 mm. increments. The drills are made with oversize ground shanks and are available with either straight or spiral flutes. Because of their rigidity, the Sphinx drills are used in automatic machines and for all types of work where accurate and straight holes are required.

#### Reel and Stand for Handling Steel Coils

For the handling of steel coils, Palmer-Shile Co., 16022 Fullerton, Detroit 27, Mich., has announced a simple rotary device which is said to reduce down time on production machinery by the direct feed of coil from the reel.

The reel can be built to any capacity, and the stand is designed for heavy duty, with a ball bearing race-

way for holding the reel. Adaptors for the reel are built to handle any diameter of coil. The reel and stand, it



#### **Automatic BAR FEED ATTACHMENT**

Kalamazoo Metal Cutting Band Saws lead the field. Get details on

MODEL 8C Cuts 8" round, 16" flat, 8" pipe.

MODEL 1220 Cuts 12" round, 20" flat.

MODEL 610 Cuts 6" round, 10" flat. Converts Kalamazoo metal cutting band saws to fully automatic cut-off machines. Feeds rounds, flats, hex, pipe, tubing, etc.—any length from 3/16" to 12".\*

Here's truly automatic sawing that offers you savings never before possible at such a low investment.

\*Additional feeding length to 30" available at extra cost.

GET FULL DETAILS FROM YOUR Kalamazoo DEALER, TODAY.

MACHINE TOOL DIVISION

#### Kalamazoo TANK and SILO CO.

910 HARRISON ST., KALAMAZOO, MICHIGAN





Palmer Shile Reel and Stand

is claimed, provide convenient space-saving coil storage and are easy to transport. The unit can be lifted by a fork truck or crane and is of all-welded steel construction.

## has it...



### the information you want!

YOUR industrial distributor can tell you many ways in which you can save money by using Bunting Bronze Bearings and Bars and the other material and equipment items he sells.

He has selected each of the countless things in his stocks after careful study and comparison, seeking those which will do the most for you.

YOUR BUNTING distributor is the leading industrial distributor, or a stock-carrying specialist in certain industrial items. With money-saving convenience, he can supply hundreds of different sizes of completely machined and finished Bunting Standard Stock Industrial Bearings, Electric Motor Bearings and Precision Bronze Bars.

Bunting

R





The Bunting Brass & Bronze Company . Toledo 1, Ohio . Branches in Principal Cities . Distributors Everywhere

Ask him for a Bunting Catalog which gives complete dimensional and technical data.

#### Spherical Bearing Is Designed for Severe Operating Conditions

The Delron Co., Inc., Bearing Division, 5224 Southern Ave., South Gate. Calif., has announced a spherical bearing which is especially adaptable where severe operating conditions require special materials, high temperature resistance and heavy load carry-

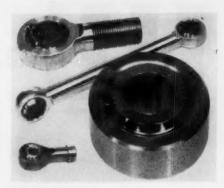


MAGNIFIES the "hard to read" vernier scales on calipers and height gages. No more eye strain, guess work or hit or miss setting and reading. LENS is finest quality optical glass, specially designed and ground for the purpose with utmost optical skill. 4X magnification shows lines true and correct. In daily use in plants of

shows lines true and carrect. In daily use in plants of Westinghouse, General Electric, General Motors, Chrysler, Packard, Ford, Beeing Aircraft, Bondix Aviation and many others engaged in defense work. Made in 3 sizes to fit Starrett, Brown & Sharpe, Lufkin Tools, and others of similar design. S No. 100 for 6" Vernier Calipers; S No. 200 for 10"-12" Height Gages, also 10"-18"-24" Vernier Calipers; S No. 300 for most popular type 18" and 24" Height Gages and for 38"-48" and 60" Calipers.

For Complete Information Write, Phone or Wire

STEBAR COMPANY 711 W. Lake St. Minneapolis 8, Minn.



Delron Spherical Bearings

ing ability. The bearing is produced as two pieces by a unique method which is said to require no swaging operations for assembly. According to the manufacturer, elimination of the swaging provides unusual conformation between ball and race, resulting in maximum bearing area and heavy allowable radial and axial loads. The bearing design can be constructed in a wide variety of materials, and selective and close tolerance fits between the race and ball are said to be practical.

The spherical bearing is available in many configurations, including rod ends, and sizes up to No. 16. The manufacturer states that the bearing is ideal for heavy load applications, such as mounting jet engines in aircraft.

#### **COLLET TYPE** PIN GAGE HANDLE

Bushings for cylindrical and thread plug gages.



GREEN

Complete line of gage supplies, handles, blanks, ring gage parts, etc. from stock.

HURON MACHINE PRODUCTS INC. 6252 Monroe Boulevard
DEARBORN, MICHIGAN



Granite Surface Plates perfected by Herman Stone are the most accurate standard of measurement you can use. Here's why: Granite is harder than most any type of tool steel. It stays as level as Herman Stone grinds it—and that's really level! The 25ton oversize plate shown here has a mean overall tolerance of .005!

- Granite is Changeless—cannot warp and is not affected by stain. Herman Stone selects only the most perfect even-textured granite.
- Permanently Level—Granite won't swedgel
- Longer Wearing—Granite is harder than most tool steels. Won't rust—nonmagnetic.
- Practically no maintenance costs!

Easy to clean. Less inspection needed (for you know it cannot warp, dent or bulge). Less resurfacing—some Herman Stone Plates have been in constant use for more than 12 years without a single resurfacing! Think of the time and money saved!

Let us advise you on your surface plate needs. Regular sizes, both pink and grey, are carried in stock. Oversize plates are made to order. Write for descriptive folders. No obligation.

The Herman Stone Co.

324 Harries Building, Dayton 2, Ohio First in the Field—Still First in Quality

#### Single Face, Flat Lapping Machine Features Semi-Automatic Feed

Designated as the No. 36-F "Hyprolap," a single face, flat lapping ma-



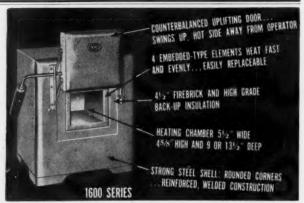
Norton No. 36-F "Hyprolap" Single Face, Flat Lapping Machine

chine which has semi-automatic feed has been announced by Norton Co., Worcester 6, Mass. According to the manufacturer, the machine is designed to produce a maximum amount of pieces per hour as a result of the provisions for continual lapping and the complete lapping of work in a single pass around the lap. The machine utilizes bonded abrasive laps, and grit is washed away by the stream of filtered coolant on the lap. Lapping is interrupted only to true the bonded abrasive lap. Truing is accomplished by a diamond held in a variable speed, power operated truing arm. An opening is provided in the work holder to permit truing the lap without removing the work holder. In addition, the truing speed can be quickly adjusted.

The machine is designed for easy operation. Work loading and removal, truing of the lap and the very few functions necessary for machine control are performed from the operator's position. In normal operation, the operator merely loads with his right

### solve heat-treat problems

with versatile Temco benchtype furnace



Step up production, cut costs with Temco electric furnaces for heat treating dies, parts, tools, etc. Model illustrated above one of eight convenient sizes available with either electronic or manual temperature controls. Economical, easy



THERMO ELECTRIC MANUFACTURING CO.

to install and operate, low cost. Priced from \$55.00 to \$507.50. Write for literature and nearest dealer's name.

488 HUFF ST., DUBUQUE, IOWA

JOHNSON ELECTRIC MOTOR
BEARINGS



Greatest selection on the Market

Catalog lists, illustrates and describes each bearing Write today for your copy



Now you can replace any sleeve bearing in any make of motor. There are more than 340 individual bearings—from stock at your authorized Johnson distributor and Johnson warehouses. In every case Johnson EM Bearings are equal to or better than the original equipment. They are correct in design, tolerance and alloy, ready for immediate installation. Each bearing is made to precise motor specifications, flanges, oil holes, oil grooves, slots and tolerances correct for each job.

JOHNSON BRONZE COMPANY

590 South Mill St., New Castle, Pa.

JOHNSON BEARINGS

hand and removes the finished pieces with his left hand. A work pressure arrangement automatically applies the proper weight to the parts grouped in each work holder to secure the desired lapping action. This arrangement lifts the weights clear as they pass through the loading station to permit loading and unloading. The weights are then applied to the newly loaded pieces as they are moved out of the loading area. The machine can be arranged

for fully automatic continuous feed operation by the addition of suitable loading and unloading devices.

#### Hydraulic Milling Head Is Powerful and Compact

A hydraulic milling head which is designed to meet the need for high horsepower requirements and yet is compact enough to allow installation to be made in space available has

> been announced by Romulus Tool & Engineering, 13581 Huron River Drive, Romulus, Mich. The





Romulus Hydraulic Milling Head

head is available with any combination of horse-power and revolutions per minute required, starting at 5 h.p. up to 150 h.p., from 10 to 7,000 revolutions per minute.



Here's the new Model 50 Sundstrand self contained lift magnet with a lifting capacity of 2,000 lbs. It eliminates chain or rope hitches and length of haul is not restricted by cords or wires. It's operated by a 6 volt wet cell automobile battery. A recessed control panel

contains an operating switch, a dial to indicate the need for re-charging and a receptacle for a trickle charger plug. It has a 7" x 12½" magnetizing surface and weighs only 120 lbs.



Left, milling machine table being lowered into position on machine base.

Above, odd shaped parts are easily handled with Sundstrand Lift Magnet.



FREE DATA Write for complete information on this new efficient "Battery Operated" lift magnet. Ask for bulletin 547-M.

### SUNDSTRAND Magnetic Products Co.

Division of Sundstrand Machine Tool Co. 1020-9th ST + ROCKFORD, ILLINOIS

#### Gage Directly Reads End Diameters of Chamfers to 1 Inch from 90 to 127 Degrees Included Angle

Acme Industrial Co., 212 N. Laflin St., Chicago 7, Ill., has announced a chamfer micrometer gage, designated as the Model 127, which is designed to directly read end diameters of chamfers up to 1 in. from 90 to 127 degrees included angle. According to the manufacturer, the gage simplifies computing chamfer depths and reads

GATIO

#### DRILL and PILOT BUSHINGS Frictionless

-Rotary For core drilling, T. C. and high speed boring, turret tool, piloting, etc. Won't stick or clog. I Dust Write for details.

GATCO ROTARY BUSHING CO. 42330 Ann Arbor Road, Plymouth, Michigan

Monarch Precision SHAPLANE Radius Tools



Five Models for

LATHES, SHAPERS, PLANERS, AND BORING MILLS.

RANGE 1/2" TO 3" RADIUS (MODELS ALSO AVAILABLE FOR CONVEX CUTTING, AND CONCAVE RADII TO 6" ON PLANERS, ETC.)

C. B. TEETER **Tool Room Specialties** 

4470 Oakenwald Ave., Chicago 15, III. Phone Brexel 3-3571

like any standard depth micrometer. A master check bar with known indicated end diameter and chamfer is



Acme Chamfer Micrometer Gage

furnished with the gage for checking calibrations of the micrometer. The gage is individually packaged in a protective, felt-lined case.

#### High Speed Steel Is Treated with Molybdenum Sulphide

Designated as "New Molite Smooth Cut," a molybdenum-sulphide "selflubricating" molybdenum-tungsten high speed steel has been announced by Columbia Tool Steel Co., Chicago Heights 6, Ill. According to the manu-

HIGH

SPEED

DRILLS

FLAT TWISTED AND ROLLED SECTION

Special Lengths and Types, Prompt Delivery. Manufacturers Since 1903

HI-DUTY DRILL WORKS

FLEETWOOD, PA.



LIST PRICES F.O.B. Milwaukee, Wisconsin (Subject to Revision)

| Cyl. Dia.<br>Boro | STOCK |        | STROKE LENGTH |        | GTHS   | - All  | Double | Acting |        |
|-------------------|-------|--------|---------------|--------|--------|--------|--------|--------|--------|
| -                 | 1"    | 2"     | 3"            | 4"     | 6"     | 8"     | 10"    | 12"    | 15"    |
| 11/4"             | 24.16 | 25.72  | 26.08         | 26.44  | 27.16  | 27.88  | 28.60  | 29.32  | 30.40  |
| 2"                | 26.24 | 27.88  | 28.32         | 28.76  | 29.64  | 30.52  | 31.40  | 32.28  | 33.60  |
| 21/2"             | 32.36 | 34.12  | 34.68         | 35.24  | 36.36  | 37.48  | 38.60  | 39.72  | 41.40  |
| 3"                | 35.04 | 37.28  | 37.92         | 38.56  | 39.84  | 41.12  | 42.40  | 43.68  | 45.60  |
| 4"                | 40.84 | 43.68  | 44.52         | 45.36  | 47.04  | 48.72  | 50.40  | 52.08  | 54.60  |
| 41/2"             | 48.96 | 51.92  | 52.88         | 53.84  | 55.76  | 57.68  | 59.60  | 61.52  | 64.40  |
| 6"                | 66.60 | 70.80  | 72.20         | 73.60  | 76.40  | 79.20  | 82.00  | 84.80  | 89.00  |
| 8"                | -     | 126.80 | 129.20        | 131.60 | 136.40 | 141.20 | 146.00 | 150.80 | 158.00 |

you buy quality cylinders at lowest prevailing prices, you eliminate waiting for "specials", reduce engineering costs. Compare the prices and scope of NOPAK Shelfstock (1½ x 1" to 8 to 15") with competitive offerings—and you will specify NOPAK.

- Basic mountings "A" or "E" convertible to "B", "C", "D" or "F", (see below) by changing cylinder heads. Add 10% to above prices, (no extra charge 8" bore).
- Piston Rods NF male thread.
- Cushioning can be eliminated on rod, blank or both ends by removing spring and ball-check.

NOPAK 4-Way Valves, hand, foot, solenoid, or pilot operated, to actuate all cylinders, also in Shelf-stock.

GALLAND-HENNING NOPAK 2758 South 31st Street, Milwaukee 46, Wisconsin

Representatives in Principal Cities



TEAR OUT THIS AD for Reference — or write for extra copies.

A 8003-1/2-IAR

facturer, by means of special additives the machinability of the M2 type high speed steel has been improved 50 per cent, allowing faster speeds, feeds and depth of cut without increasing tool wear. The self-lubricating qualities of the hardened tools, it is claimed, minimize friction and improve tool life considerably. The molybdenum-sulphide treated high speed steel is said to be ideal for use on all applications where

standard M2 type high speed steel is used, including all cutting tools, punches, dies and inserts.

#### High Speed Cut-Off Blade Is Ground on All Four Sides

Armstrong Bros. Tool Co., Dept. R-55, 5228 W. Armstrong Ave., Chicago 30, Ill., has announced a high speed ground cut-off blade which is ground on all four sides, having top

and bottom edges ground and sides bevel ground for use in cutting-off tools. The blade, made of fine



Armstrong High Speed Ground Cut-Off Blades

grade high-speed steel, is available in a full range of eight sizes from 3/32 x 1/2 x 41/2 in. to 1/4 x 1 1 x 7 in. in two series one for use in straight and right-hand offset tools, the other for use in lefthand offset tools. Each blade is packaged for convenient handling.



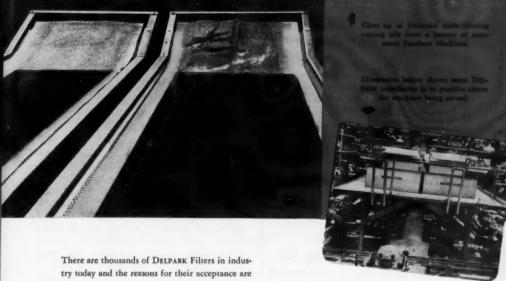
CE ABRASIVE LABORATORIES

35 ROSELLE STREET, MINEOLA, N. Y.

Delpark FILTRATION

PRATT & WHITNEY AIRCRAFT

filters Aluminum Chips from Cutting Oil



simple. The savings in maintenance labor alone is enormous yet other savings in reduced rejections, extended coolant and tool life and reduced machine parts replacements add up to even greater savings. Here is one part of production where costs can be materially reduced without retooling for design changes. Here, with DEL-PARK filtration, greater efficiency of men and

machines can produce better products at less cost with greater accuracy.

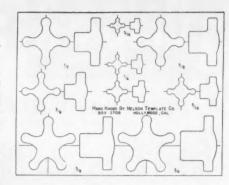
It's a simple operation to let DELPARK filtration lower your operating costs and increase your profits. Let an experienced DELPARK filtration engineer give you the facts on DELPARK filtration. Write for more complete information.

Delpark

INDUSTRIAL FILTRATION COMPANY, IS INDUSTRIAL AVENUE, LEBANON, INDIANA

#### Templates for Tool and Mechanical Designers

A line of templates for tool and mechanical designers is now being marketed by Nelson Template Co., Box 2708, Hollywood 28, Calif. The line includes a hand knob template, 0.025 x 8½ x 11 in., with nine sizes of knobs; a wing nut template, 0.020 x 51/2 x 81/2 in., with seven sizes of wing nuts; and a thumbscrew template, 0.020 x 51/2 x 81/2 in., with nine sizes



Nelson Hand Knob Template

WHITNEY **Bench Punch** 

> A very efficient and satisfactory tool for general use, shop or experimental

No. 91

Depth of throat -5 inches.

Capacity - 1/2 thru 1/4 or 2 thru 1/8".

Notches angles 11/2 x 11/2 x 1/8.

Punches supplied in rounds, squares, ovals, rectangles or specials. Especially adaptable for experimental work. Also made in 10", 18" and 24" depth of throat.

Write for catalogue.

W. A. Whitney Mfg. Co.

640 Race St.

Rockford, III.

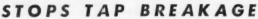
of plain thumbscrews and seven sizes of shoulder type thumbscrews. All templates are made of cellulose acetate.

#### Combination Hydraulic Forcing and Straightening Press Features **Ouick-Change Tables**

Stanley H. Holmes Co., 3300 W. Lake St., Chicago 24, Ill., has announced a hydraulic press which can readily be adapted to do both forcing and straightening operations simply by interchanging one quick-change table with another. The tables are switched merely by removing four bolts. The press utilizes an interchangeable manifold which has only four connections and which is held in place by four bolts. The complete hy-







Cuts clean threads — acts instantaneously! Frees stuck taps and reamers right now! Speeds tapping — not a cutting oil!

> Dealers and lobbers: Some territories still available. Write:

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for
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cyclone type
TORIT DUST
COLLECTOR

### TORIT GIVES:

Easy installation
Efficiency
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Low operating cost
Easy cleaning
Long service life
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Adaptability
10 basic models

Here a Torit
19-FB Dust Collector and Torit
Wheel Hoods effectively solve the
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No lint or polishing dusts escape to endanger working conditions.

Up to 95% of the dusts spin into the pull-out drawer in the base of this Torit Dust Collector and the remainder is trapped in

Torit Dust Collectors are turning in top performances in every type of industry. They will star for you. Write for information.

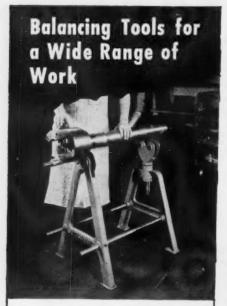


TORIT MANUFACTURING COMPANY

296 WALNUT STREET

the after-filter bag.

ST. PAUL 2, MINN.



Here's a complete line of Balancing Tools which will save their cost quickly on balancing or truing operations. Accurately sensitive and durable, they provide a simple, reliable means for checking the balance of parts like gears, shafts, fly wheels, pulleys, etc. The standard sizes available are shown in capacity chart below.

| • | A | 0 | A | r | (T) | 25 |
|---|---|---|---|---|-----|----|

| Swing  | Between<br>Standards | Weight<br>Capacity |
|--------|----------------------|--------------------|
| 21 in. | 20 in.               | 12 lbs.            |
| 21 in. | 20 in.               | 800 lbs.           |
| 43 in. | 29 in.               | 800 lbs.           |
| 43 in. | 29 in.               | 2,000 lbs.         |
| 6 ft.  | 5 ft.                | 5,000 lbs.         |
| 8 ft.  | 8 ft.                | 10,000 lbs.        |
| Any    | Any                  | 24,000 lbs.        |
| 43 in. | 30 in.               | 800 lbs.           |

### FREE DATA



You can obtain complete information on Sundstrand Balancing Tools by writing for bulletin 548.



SUNDSTRAND MACHINE TOOL CO. 2539 Eleventh Street, Rockford, III., U.S.A.

draulic system can be readily removed and replaced. According to the manufacturer, the use of O-ring gasket mounted valves eliminates the need for pipes as the oil flows through the drilled manifold plate. The machine incorporates a swing-out motor and pump panel which can be lowered to a horizontal position, thereby making the motor and pump power unit accessible for inspection, maintenance or service. The press has



Holmes Combination Hydraulic Forcing and Straightening Press with straightening table

built-in adjustable illumination, consisting of a frosted incandescent tube which lights the entire working area.

The all-steel welded frame, designed to provide maximum strength with minimum weight, is stress relieved to assure stability and is heavily reinforced at points of stress for rigidity. The press also features ground and polished ram, sliding ram guide, simple ram adjustment, accurate oil level gage and precision pressure dial. A wide variety of manual and automatic controls is available to meet specific requirements.

## It's CHALLENGE CAST-IRON TOP WORK BENCHES

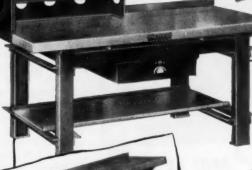
for all-round shop efficiency!

### 3 Styles - 4 Sizes

All with durable 2-inch warp-proof, shrink-proof, fire-proof cast-iron top. All have leveling screws. All built to a high standard of Quality.



Challenge Work Bench with tool box shelf.



Challenge Work Bench with Cast-Iron Top, Tool Box Shelf and a Steel Drawer with Pilfer-Proof Lock.

### TOP SIZES

4 Legs 6 Legs 28×48×2 28×72×2 28×60×2 28×84×2



### Semi-Steel

LAYOUT SURFACE PLATE for layout, inspection or assembly lines. Available either precision ground or planer finished. Sizes from 12x18" to 54x144".



#### 772



THE CHALLENGE

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TRADE-MARK ®

DEALERS IN ALL PRINCIPAL CITIES

#### Supreme Chuck Key Package Features Inventory Control System

Supreme Products, Inc., Chicago 16, Ill., maker of Supreme Brand Chucks, has introduced a new line of packages for its chuck keys. On the end of the new package is a series of numbers, reading 10-9-8-7-6-5-4-3-2-1, so that when clerks remove keys from the box to fill orders, a line is marked through a number; therefore, the

quantity of keys remaining in the box is always in plain view. This method is said to be a time saver at inventory time and also a quick reminder to reorder when the stock is getting low.

### Tool Is Designed for Difficult Hole Cutting, Clean-Up and Sizing Jobs

Identified as the "Hole-Maker," a tool which is designed for difficult hole cutting, clean-up and sizing

jobs in steel, cast iron, aluminum and its many alloys and other common metals has been announced by Robert H. Clark Co.. Santa 9330 Monica Blvd., Beverly Hills. Calif. High efficiency is said to be ensured by grinding correct clearance angles on bits and using proper cutting speeds and feeds for each respec tive metal. The tool, it is claimed, produces clean, true holes in all thicknesses between heavy plate and skintype materials. Due to its three-bladed design, at least one bit remains in constant contact with

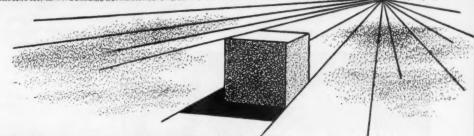


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Bridgeport, Conn.

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All industrial results are achieved in Time . . . vital 4th dimension that measures output, costs, profit. Shorten the time gap between operations . . . shorten the time when machines are "cutting air" . . . keep machines producing at a steady optimum rate during the fatigue slow-down from 10:30 to noon, and from 3 P.M., till closing time . . . and you are getting 4th Dimension production. Production that is geared to the steady flow of Time.



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Time losses account for the enormous differences in output among workmen. By eliminating these losses automatically, the Lipe AML Bar Feed boosts overall production from 30% to 100%. That's because stock is fed to the machine independent of the operator. Constant pressure behind the stock assures uniform speed of feed. No feed fingers to fail or mar stock. No multiple feed-outs, even on the longest pieces.

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the work, even on curved surfaces, ensuring smooth cutting action and freedom from grabbing on intermittent cuts. Each bit is adjustable within its tool slot, quickly compensating for wear and permitting considerable variation in hole sizes produced with a single tool.

Smoothness of performance is said to be the result of a conically shaped centerpiece produced by the bits. Cutting edges of each blade are the inside vertical faces. Since the bits surround the cone and are in contact along the full cone height, a three-point bearing occurs between cutters and cone. This bearing, it is claimed, not only centers the tool, guiding and stabilizing the cut, but cutting forces are equalized between each bit. Outer tips of the bits establish bore size and are said to cut through smoothly and without ragged break-outs. The tool is equipped with a removable pilot which may be replaced with a pilot drill. Cutter bits are standard square

high speed steel and can be furnished ground with correct angles ready to use in specific mate-



UP TO 45,000 R.P.M. AND 1/2 H.P. ON AC/DC. Only PRECISE has the speed, power and precision needed to turn Tungsten Carbide Mills as well as all other rotary tools with shank diameters to 1/4 ". Grind, mill, finish, polish any material from wood to the hardest alloy steel. MODELS SUPER 30 and SUPER 40 are for hand applications or machine set-ups, PRECISE SUPER 50 is for heavy duty in machine set-ups. Precision quills and chucks; lifetime-lubricated, micro-precision bearings; machined metal housings. Mounts and accessories for each model extend versatility on standard machine tools.



PRECISE SUPER 30
45,000 R.P.M.
and 1/s H.P. in 35
az. Draw collet.

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PRECISE PRODUCTS CORP. 1345 Clark St., Racine, Wis.



Clark "Hole-Maker"

rials. Adjustment of the bits in their angular slots permits a full 1 in. increase in diameter over the minimum hole size. The tool is available in five sizes ranging from 1 to 6 inches.

### Why You Should Prefer a LINCOLN PARK DIAL SNAP GAGE

There are scores of advantages in using any products made by Lincoln Park Industries. Read these regarding the Dial Snap Gages:

- Lincoln Park Dial Snap Gages are designed to give direct reading from the measuring anvil to indicator.
- There are no bearings, levers or cams to get out of order.
- By means of its fine pitch ground thread screw attachment, the upper anvil can be adjusted within a 1/4" range.
- Even when used by inexperienced operators, Lincoln Park Dial Snap Gages present no possibility of damage by accidental shock. The indicators themselves are encased in a housing to protect them from damage.
- Because these gages have a minimum of parts to wear or be replaced. maintenance is negligible and longtrouble-free operation is assured.
- The parallel anvils are carbide-tipped.



STANDARD GAGE—size range from 0 to 5" (special length gage for crankshaft inspection shown).



RETRACTOR TYPE-for gear or spline checking. Special anvils can be supplied.



SPECIAL BENCH TYPE with carbide ball anvils, for checking pitch diameters



BENCH or COMPARATOR TYPE-for checking small parts.



THE PLUS IN PRECISION

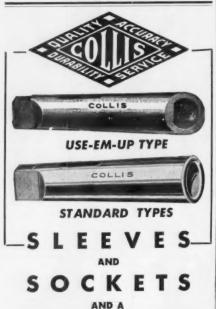
LINCOLN PARK 25, MICHIGAN



DESIGNERS AND MANUFACTURERS OF SPECIAL AND STANDARD CARBIDE CHROME PLATED AND STEEL GAGES CARBIDE ROTARY FILES . ALSO FACILITIES AND SKILLED PERSONNEL AVAILABLE FOR PRECISION PARTS PRODUCTION

#### Machine Marks Large, Assembled Parts

Identified as the Model No. 99-A, a power operated marking machine which is said to make marking of large, assembled parts possible and practical whether the marking is to occur on a flat or curved surface has been announced by The Acromark Co., 9 Morrell St., Elizabeth, N. J. The machine is driven by a gear reduction motor that provides ample



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• COLLIS Taper Tools are made by men skilled in this type of manufacture. Users get long satisfactory service from COLLIS Equipment and find the answer to all drilling, reaming, and tapping needs in the COLLIS line. We can give prompt service on orders for Lathe Centers, Arbors, Drill Drifts, and Magic Type Chucks as well as on Sleeves and Sockets and Collets.

### THE COLLIS CO.

DEPT. A, CLINTON, IOWA



Acromark Model No. 99-A Power Operated Marking Machine

power for the marking of metal parts, including housings, metal boxes, tote pans, signal system parts, large jigs, fixtures and other equipment. The marking is automatic but not the feeding and removal of the work; however, automatic feeders and ejectors can be readily attached. An operating lever at one side of the gear reduction box enables the operator to stop and start the machine when desired.

All operating parts, with the exception of the marking die, are completely enclosed for safety. The adjustment is said to be sufficient to handle variations up to 2 in., and the length of stroke of the machine is 8 inches.

The overall size of the machine is approximately 24 in. high x 18 in. deep, including the motor mounting,



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NAME PLATES - PANELS - DIALS



10,000 IN USE Accepted by all leading manufacturers as the speediest, most versatile portable engraver. Only the NEW HERMES has these patented features:

- Adjustable for 15 ratios.
   Self-centering holding vise.
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   Adjustable copy holders.

Send for Catalog No. IM-27, describing full line of Engraving Machines including HEAVY DUTY BENCH TYPE MODEL (200 lbs.)

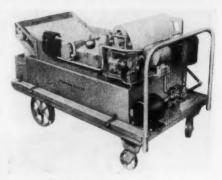
NEW HERMES ENGRAVING MACHINE CORP.

13-19 University Pl., New York 3, N.Y.

and the overall width left to right is 36 inches. A part 9 in. or less in thickness can be marked in the Model No. 99-A machine.

### Portable Filtration Unit Incorporates Disposable Belt-Type Filter

A portable filtration unit which incorporates a disposable belt-type filter has been added to the Delpark line by Industrial Filtration Co., Dept. P-294, Lebanon, Ind. The unit, mounted on casters, can be easily transported for periodic filtration of various liquids and oils which do not require continuous filtration. The unit makes use of a variety of filter media for numerous filtration requirements and may be used on quenching oils, cutting oils,



Delpark Portable Filtration Unit

coolants, hydraulic oils, test stand oils and many other industrial applications. The belt-type filter is said to provide continuous and automatic filtration.

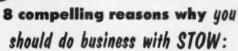


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- 1. DEPENDABILITY—Stow Engineers are flexible shaft specialists.
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- LARGE VARIETY of standard terminal parts available.
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N40 Streamliner—One of a complete line of STOW flexible shaft machines. Write today for Catalog 51.

STOW MANUFACTURING CO.

1 Shear St., Binghamton, N.Y.





Millit Slotting Saw

### Slotting Saw Has Anchored Carbide Tips

Millit, Inc., 31 Flint St., Rochester 8, N. Y., has announced a slotting saw which features anchored carbide tips.

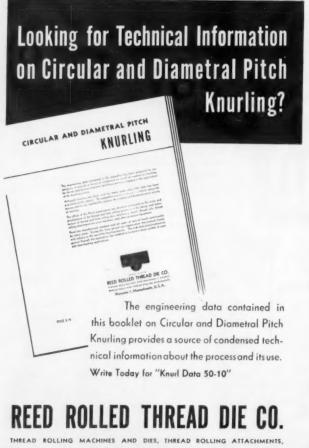
The long carbide tips are retained by a braze in a body slot below the flute

depth of each tip. The braze area is long for maximum rigidity. The saw is available in any decimal size from ½ to ½ in. in width. Special diameters and hole sizes are also available.

### Three-Station Machine Includes Drill Unit, Broaching Machine and Stamping Unit

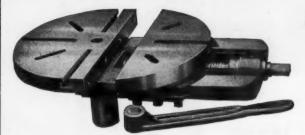
Colonial Broach Co., Detroit 13, Mich., has developed an automated three-station machine to include a

drill unit, a broaching machine and a stamping unit. All individual operations are performed on a single common base in one continuous cycle. All three individual machining operations are grouped around the "heart" of the machine — the loading and indexing mechanisms. Included in the loading and indexing fixtures are locating guides that maintain all three operations in proper relationship to one another. Broaching is accomplished by a Colonial RD-624 pull-down broaching machine. A special hydraulically actuated unloaded deposits the completed parts onto a conveyor.



THREAD ROLLING MACHINES AND DIES, THREAD ROLLING ATTACHMENTS, THREAD ROLLS AND KNURLS FOR AUTOMATIC SCREW MACHINES AND TURRET LATHES WORCESTER, MASSACHUSETTS, U.S.A.

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FREE TRIAL OFFER

For Faster, SAFER Work in Your Maintenance Department

Combines a drill table, a vise, a set of parallels and V block. No more lost fingers, from hand held jobs that slip. No more 30 minutes set-ups for a 1 minute drilling operation. Made in 6 sizes, from 8" to 28" dia. We guarantee each Safety Drill Table will save its cost on labor alone in 6 months, to say nothing of plant down time when vital maintenance is delayed even a few minutes.

### WRITE FOR FREE FOLDER

Shows many typical set-ups, and use on radial drills. Complete specifications on all models. Covers MONEY BACK GUARANTEE and 30 DAY FREE TRIAL OFFER.



MODERN MACHINE TOOL CO.

Jackson, Michigan



### Queen City

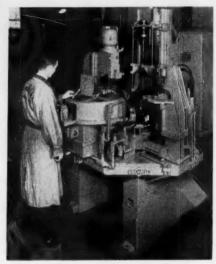
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So good they're guaranteed: "try one for 30 days... if you're not satisfied, return it." It makes cents... and dollars... to buy equipment like that at prices 20 to 30% under competing makes!

The complete range of Queen City Grinders and Buffers... floor and bench types... is described in newly-revised literature.

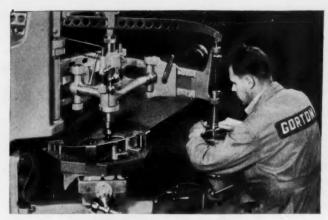
WRITE FOR FREE CATALOG TODAY!

QUEEN CITY MACHINE TOOL CO. 3911 Kellog Ävenue, Cincinnati 26, Ohio "High Quality—Low Cost—For over 50 Years" The indexing table is located offcenter and below the loading table. Parts are loaded six at a time into circular holders on the ends of oscillating loading arm. Each holder contains an escapement mechanism allowing the parts to drop, one at a time, onto the indexing table. When the sixth part drops, it triggers a switch that swings the arm around to a position where the empty holder is reloaded and the holder on the opposite end begins discharging parts into the



Colonial Automated Three-Station Drilling, Broaching and Stamping Machine in use

chucks on the index table. The rotating index table is hydraulically actuated. It contains around the periphery four equally spaced special chucks that receive and locate parts from the loading mechanism. A hole in the indexing table between adjacent chucks allows the broaching tool to be returned following its working stroke. This means that the table is indexed every 45 degrees. A 10-h.p. motor supplies the hydraulic power for loading, indexing, broaching, stamping and unloading.



### Gorton Pantograph Does Job 7 Times Faster

In only 40 minutes this tracer-controlled pantograph cuts and blends a thermal slot in an 8-foot steel propeller blade — a job that requires 5 hours 10 minutes by other methods. This is typical Pantograph performance—one of hundreds of examples.

### Gorton Pautography Brings Creative Production to Your Plant

What's your problem in machining? Depend on Gorton Pantography to help you *create* a new production method if your problem falls into any of these categories:

#### **OPERATIONS**

Inside profiling Outside profiling Routing Die sinking Mold cutting Counterboring Contour Milling Chamfering Grooving Graduating Engraving

Gorton Pantography works in two or three dimensions, in all directions, horizontally and vertically on ferrous or non-ferrous metals or in plastics. Easily made, inexpensive enlarged masters are employed and work is done at a reduction ratio which increases accuracy — an exclusive pantograph benefit.

Whether a dozen or a thousand pieces, each is identical in shape and tolerances to the first. Operation during cutting cycle is manual or automatic, and work piece size varies from the diameter of a dime to areas as large as ten feet.

Clip the coupon for your copies of the Gorton catalog and the helpful booklet, "Pantography."

GEORGE GORTON MACHINE CO.

Please send at once complete information about the Gorton line contained in Bulletin 1655 1709,

Firm......Name

Title

Address City, State

1709 Racine St., Racine, Wis., U. S. A.

A 7787-1P-A

#### Manifold-Type Valve Permits Quick Replacement of Critical Parts

Beckett-Harcum Co., 1090 Wayne Rd., Wilmington, Ohio, has added to its Hi-Cyclic line a manifold-type operating valve which has been specifically designed for automation or other control setups where precise control, long valve life and minimum downtime for parts replacement are vital. The manifold construction is said to

permit rapid replacement of all critical parts, including the valve body and spool assembly, without disturbing the piping or the main manifold block. Electrical valve models also feature a built-in junction box and quick-disconnect electrical connections. Solenoid coils can be removed without disturbing the electrical circuit. All electrical leads are channeled from a 1/2-in. N.P.T. size conduit outlet located at the base of the valve.

> The manifoldmount valve is available for air or other non-corrosive gas and oil or water hydrau-



Yates-American J-120 20" Band Saw

- Provide 2 to 4 times more wear
- Provide perfect traction and balance
- Jiffy Tires are safe . . . won't throw at any speed

Available only thru Band Saw Manufacturers

#### CARTER PRODUCTS COMPANY, INC.

426 Wm. Alden Smith Bldg. 30 Ionia Ave., S. W. Grand Rapids 2, Michigan



Beckett Hi-Cyclic Manifold-Type Valve

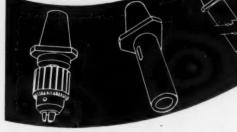
lics. Valve types include threeway, four-way, two or three position, in 1/8, 1/4, 3/8. ½ - in. (modified) nominal N.P.T. sizes.

Actuators include single solenoid, double solenoid, piloted. hand lever, finger-tip lever and cam roller, with

## Quick Change Tools

FOR

- . BORING
- · MILLING
- . DRILLING
- · & TURRET
- · LATHE USE



P. D. Q.

(PORTAGE DOUBLE-QUICK)

Changes from one tool to another is a matter of seconds. Three point locking feature and tapered shank assures repositioning and eliminates "run out."

Send for catalog describing individual holders and adapters or for specific information on your machine tools.

PORTAGE Double-Quick TOOL CO.

1041 Sweitzer Avenue · Akron 11, Ohio

detent and spring load to center on three-position models. Combinations of these actuators are also available. The valve is designed to exceed the most critical standards. There are no valve packings. Seal is obtained by precision fit. All materials used are corrosion-resistant, and the materials in contact with the medium are bronze and stainless steel. Solenoids used on electrical models are continuous duty and provide long life due to

the use of resilient bumpers which absorb shock of both the energizing and de-energizing strokes.

#### Telescopic Lift Truck Has Stacking Height of 110 Inches

Designated as the Model 110, a telescopic, battery-operated hydraulic lift truck which has a stacking height of 110 in. has been introduced by Big Joe Mfg. Co., 900 W. Jackson Blvd., Chi-

cago 7, Ill. The lift truck, it is claimed, is specifically designed for in-between handling, the



Big Joe Model 110 Telescopic Battery-Operated Hydraulic Lift Truck

short distance manipulation of materials too heavy for manual handling yet not requiring heavier power - driven equipment. The Model 110 extends the range of hydraulic handling equipment offered by the company.



Use an Onsrud Air Turbine Grinder just once, and you'll never want any other kind. High efficiency turbine keeps grinding wheel turning full speed under load. No annoying RPM slow-up to slow-up your work. High air turbine speed lets you use low cost, small diameter wheels . . . give right speed for fast work. Always runs cool . . . light in weight. Grease packed bearings save on tool maintenance.



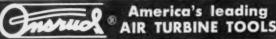
For information . . . write for free Onsrud Grinder Bulletin 1129

### ONSRUD MACHINE WORKS, Inc.

3924 Palmer Street

Chicago 47, Illinois







## Can you identify these HARDINGE Collets?

Collet "A"

CAPACITY: 1" Round, 78" Hexagon, 34" Square

USED ON: Hardinge Lathes, Millers, Second Operation Machines, Chucking Machines, Index Fixtures and Sjagren Chucks. Also used with 10"
South Bend, 10" Monarch, Sheldon, Rivett and Elgin Lathes;
Schauer Polishing Machines; Mead and Zagar Fixtures.

Capacity: %" Round, %" Hexagon, %" Square
USED ON: 12" and 14" American; 14" Cincinnati; 12",
12", 14", 16" and 18" Monarch; 9", 15" a

USED ON: 12" and 14" American; 14" Cincinnati; 12", 14" and 16" Hendey; 12", 14", 16" and 18" Monarch; 9", 15" and 16" Rockford; 12", 14" and 16" Sebastian; 14" and 16" Springfield Lathes.

Stock Delivery: Both Collets Carried in Stock for Immediate Delivery from Twelve Conveniently Located Warehouses. Write Hardinge Brothers, Inc., Elmira, New York for Complete Bulletin 50.

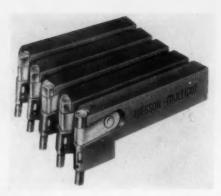
Collet "A" is a 5C Hardinge. Collet "B" is a 3H Hardinge. .. is a 5C Hardinge.

#### Improved Toolholder Features Height Gage and Insert Removal Slot

Wesson Co., 1220 Woodward Heights Blvd., Detroit (Ferndale 20), Mich., has announced that its bandtype "Multicut" Toolholder now incorporates a precision ground carbide height gage for more rapid insert set







Wesson Improved "Multicut" Toolholders

up. Permanently brazed to the holder adjacent to the insert slot, the flush gage, it is claimed, eliminates the need for additional rules or gages for resetting inserts exactly on center. The operator merely raises the insert until it is flush with the gage, and by feeling the top of the insert and flush gage with the finger tip, the operator can set the insert accurately to 1/1000 inch.

The improved toolholder also features an elliptical slot for easier insert removal. Under severe cutting operations which generate excessive amounts of heat, the coolant and metal dust are often "baked" around the insert. Even under these conditions, the slot is claimed to make quick and simple insert removal possible.



MADE TO YOUR SPECIFICATIONS

- Except Screw Machine Cams
   Design Assistance Offered
   KIDDE PRECISION TOOL CORP.
- 37 Farrand St. Bloomfield, N. J.



### THEY RUN IN OIL!

- All parts and a patented cooling system clutch, run in a pumped oil bath which is factory sealed...resulting in smooth, trouble-free service.
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For speed, you just can't beat these new tappers. They combine every feature needed to operate at topmost production speeds, including a rigid chuck spindle supported at both ends by oilite bushings and a new indestructible friction material.

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for full details on sizes, capacities and prices



He's been carefully selected for his technical know-how, his integrity and financial soundness. As a local businessman who depends on your support, he has a personal interest in providing a satisfactory answer to your problems and in giving you fast, efficient service.



ETTCO TOOL CO., INC. 598 Johnson Ave., Brooklyn 37, N. Y.

DETROIT . CHICAGO . WORCESTER . SAN GABRIEL, CALIF. Dealers throughout the United States and Canada

#### Fixture Key Has Five Different Cross Dimensions

The development of a fixture key which fits all standard mill table slots from  $\frac{9}{16}$  to  $\frac{1}{16}$  in. by  $\frac{1}{16}$  in. increments has been announced by Vlier Engineering, Inc., 4552 Beverly Blvd., Los Angeles 4, Calif. According to the manufacturer, the five-way key eliminates the inconvenience and time lost measuring mill table slots, as well as look-

ing for the right size key or reworking keys to the correct size. Each of the five tongues of the key is said to be parallel and equidistant within a plus or minus 0.0005 in. to the shank diameter, and the actual width of each tongue is held to a plus 0.000 in. and minus 0.001 in. fit in the mill table slot. Minimum clearance in the slot is 0.0002 inch. Supporting sides over the full depth of the reamed hole is said to

eliminate wobble, assuring accurate alignment and rigidity.

Mounting the



Vlier Five-Way Fixture Key

five-way key to the fixture base is easy, requiring only two holes drilled and reamed to 0.875 inch. Changing the key size to fit a different mill table is accomplished by loosening the cap screw and rotating the key to the new size.

Each cross dimension on the key is marked for easy identification. The key can be clamped to the fixture from either the top or the bottom.



ENGIS EQUIPMENT COMPANY, CHICAGO 5, ILL.

### For faster, lower cost assembly...



You'll get big savings on assembly operations with Stackbin Assembly Bins. Work station layouts are more efficient. Parts are kept close to worker's hands . . . reaching and fumbling is eliminated. Shallow angle lip is just right for finger tip control. Operators can select with both hands. Sloping bottom feeds parts continually toward the front. With adjustable hoppers,

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Stackbin Assembly Bins feature all-welded construction with smooth, folded edges. 6 sizes with straight or tapered sides. Also available with rear-loading feature.

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Mfd. and sold exclusively by Wickware-Stackbin, td., Ottawa

"Stacked and



Still Accessible"

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Precision means excessive exactness, the QUALITY reflected in this STANDARD DRILLMASTER machine now in operation in a large automotive manufacturing plant. This STANDARD DRILLMASTER 4-Station machine is designed for spotfacing and chamfering

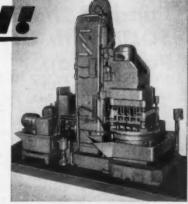
connecting rods.

The machine is equipped with a 36-inch hydraulic Index Table, carrying a 4-Station, 4-Position fixture with automatic clamping and unclamping. Mounted in the vertical column is a 24-Spindle Head, complete with production of the column o

Bushing Plate, having special anti-friction bearing type bushings for tool support and alignment. Hydraulics and Electrics are to J.I.C., standards. John S. Barnes hydraulics are employed. Production is 460 pieces

WRITE FOR COMPLETE TECHNICAL INFORMATION.

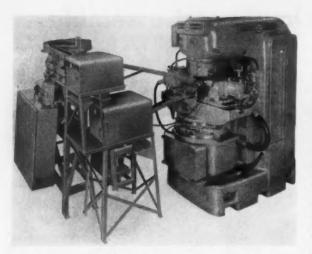
STANDARD MACHINE S.O. 4555



UNITED STATES SALES REPRESENTATIVES: ARNOLD J. WERNER CO., NEW CENTER BUILDING, DETROIT 2, MICHIGAN



MACHINE AND TOOL CO., LTD. WINDSOR, ONTARIO



Automated Machine Shaves, Inspects and Sorts Spur or Helical Gears

A completely automated gear production concept has been applied to a

Red Ring Fully Automated Gear Shaving Production

Red Ring gear shaving machine by National Broach & Machine Co., 5600 St. Jean, Detroit 13, Mich. The production unit includes vibrating hopper and straight-line feeder, automatic "in" and "out" gages, an automatic loader, a standard diagonal-type Red Ring rotary gear shaving machine and a dis-

charge belt conveyor unit. The fully automatic gages shut down the machine if it receives or produces too many reject parts. Signal lights on these devices tell the setup man

### Punches Shaped from the SOLID with OTTMANN **Punch Shaper**

#### **FEATURES:**

- 1. No holder plates required.
- 2. Simple work mounting.
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- 5. Minimum hand
- 6. Convenient, simple operation. Uses standard shaping tools.

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put small
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### LINLEY

The Linley Jig Borer provides the means . . . at very law cost . . . of handling your most exacting requirements in precision. With it you can cut costs through having a tool exactly fitted to your small work . . . save your larger machines for larger work.



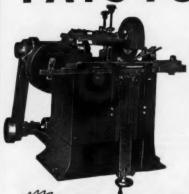
**Specifications** 

Table Movement: 6" x 10" Table Size: 7" x 171/2"

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WARDWELL MODEL EC COMBINATION GRINDER is the only single unit grinder adaptable for hack, band and circular saws that does not depend on the shape of the grinding wheel to form the shape of the tooth. This unique feature enables operator to grind a variety of blades without dressing or changing wheels.

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MANUFACTURING CO.

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Maker of largest line of saw and tool sharpening machines

quickly what is wrong, thus cutting machine downtime to a minimum.

The gears are fed by the main conveyor line to a vibrating hopper and the gear shaving, gaging, sorting and discharge operations proceed automatically. The gears are fed from the vibrating hopper and straight-line feeder through an "in" gage that checks them for size and then fed into the shaving machine by means of a magazine-type automatic loader. Finish shaved gears are automatically unloaded from the machine and fed through an "out" gage that checks the parts for size and helix angle accuracy. Gears that pass the rigid final inspection test are deposited on a small conveyor belt which carries them to the main conveyor line.

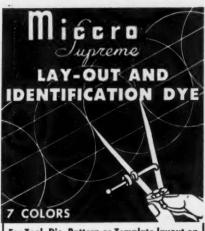
The entire automated gear shaving production unit occupies a floor space of about  $8 \times 9\frac{1}{2}$  ft. The production setup can be altered at either end to utilize a variety of work feed devices.

If desired, the "out" gage can be supplied to shut the machine down based on the production of a specified percentage of a given type of reject parts. A variety of standard Red Ring rotary gear shaving machines and automatic loaders can be adapted to the setup to accommodate gears of various types and sizes.

### Automatic Roll Marker Indents Numbers, Letters or Designs

Identified as the Automark Model RMA-1, an automatic roll marking machine which indents numbers, letters or designs on all types of metallic or non-metallic surfaces — round, flat or irregular—has been announced by Defiance Machine & Tool Co., 1924 S. Vandeventer Ave., St. Louis 10, Mo. According to the manufacturer, the device can produce as many as 6,000 impressions per hour, is powered by air and is operated by electrical





For Tool, Die, Pattern or Template layout on metal . . . Quick identification of bar stock, sheets, strips or parts . . . Shows up in sharp relief—dries instantly . . . Write for sample and circular on company letterhead.

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Easily sets on Angle Plates for Vertical or Angular Checks

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191/2 LBS

INDUSTRIAL COMPANY

212 N. LAFLIN STREET CHICAGO 7, ILLINOIS remote control for hand, foot or fixture actuation. Because the marking head and table can be moved up, down or rotated on the column, the machine is capable of accommodating unusually large parts. The table can also be removed and a large fixture face mounted to the table clamp on the column. The marking stamp is applied against the work at any desired pressure up to 7,500 lb. per sq. inch. A round stamp or marking wheel which

is automatically rolled across the part is used to mark flat surfaces. For round surfaces, a flat stamp is used.

With an accessory, the marking head can be adjusted to roll across the work a predetermined number of times to give greater depth of impression. Automatic feed fixtures, such as dial and slide units, chute feed fixtures, and motorized hopper feeds, can be supplied for use with the machine. The fixtures can be easily syn-

chronized with the machine by use of the remote control. The machine occupies a floor space of 4 sq. ft. and weighs 850 pounds. The table measures 8 x 10 in., the dis-



Defiance Automark Model RMA-1 Roll Marking Machine

tance from the center of the die slide to the column is 7 in., and the maximum height from the die slide to the base is  $48\frac{1}{2}$  in.



### the efficiency, economy and dependability of Wells Heavy-Duty Cut-Off Saws

SEARCHING for a way to reduce metal cut-off costs? Here's an answer—the Wells No. 12 Saw. It's a heavy duty, hydraulically operated saw with automatic cutting cycle designed to step up production with greater accuracy. Capacity is 12" x 16", rectangular, 123/4" dia., rounds. Ask your Wells Dealer for full information or write direct.



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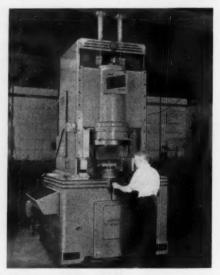






#### Machine Cuts Teeth on Large Coarse Pitch Gears

Designated as the Shear-Speed Model 18105-HD, a gear shaper which is especially designed for cutting the teeth on large coarse pitch gears has been announced by Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich. All the teeth in a gear, special cam, ratchet and other special forms are cut simultaneously by reciprocating the gear blank through the cut-



Michigan Shear-Speed Model 18105-HD Heavy-Duty Gear Shaper in use

ting head and infeeding the form cutting tools.

The machine is said to be capable of cutting gears having a maximum pitch of three. Feed and relief controls and tool sharpening compensation adjustment are located on the vertical centerline of the head and cutting tools, thus permitting the entire head assembly to be contained in a compact, rigid housing. According to the manufacturer, the heavyduty machine can handle gears hav-

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Simply insert in holes, invert, strike sharply and you



have centers and drill cir-cles perfectly located. Reduce time and eliminate spoilage of other methods. 8 sizes, from 3/16" to 3/4" U.S.S. Inexpensive — Last for years.

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5 HOUR JOB CUT TO 50 MINUT

One manufacturer was scraping flat pieces measuring 18 by 24 inches . . . each piece requiring 5 hours to scrape by hand. An Anderson Power Scraper cut scraping time to 50 minutes! That meant a substantial saving in production costs and another happy Anderson customer. Let us help you estimate how much this portable, easy-to-use power scraper will save for you.

Today, Write for Bulletin 9-35



ANDERSON BROS. MFG. CO., Rockford, III.

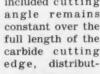
ing face widths up to 41/2 inches. The machine has a 5-in. stroke and will shape gears with diameters ranging from 5 to 10 inches.

### Shell End Mill Is Carbide Tipped Over Full Length of Flute

Sonnet Tool & Mfg. Co., 576 N. Prairie Ave., Hawthorne, Calif., has announced the addition of shell end mills to the "Helicarb" line of heavy-

duty high-production milling cutters. According to the manufacturer, the tool combines the hardness of onepiece carbide tips with the cutting efficiency of a true helix flute design. This design is said to permit the full length of the flute to be tipped with carbide, providing a cutting edge of 1% or 2 in., depending upon the diameter of the cutter. The long cutting edge enables the cutter to complete shoulder cuts in a single pass. The

included cutting angle remains constant over the full length of the carbide cutting





Sonnet "Helicarb" Shell End Mill

ing the cutting load uniformly. The resultant shearing cutting action is said to minimize impact, chatter and crumbling of the cutting edge.

The shell end mill is available for both steel and non-ferrous applications and may be used with standard shell end mill adapters. Cutter diameters range from 3 to 6 inches.

HACK SAWS - BAND SAWS

# BAND SAWS ARE SUPERIOR!



Barnes Welded Band Saws in ARC LINE; Raker and Wavy Set and Barnes SKIP TOOTH



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 Special equipment assures perfect welds.

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### "HOLE-MAKER"

Totally new maximum rigidity, no chatter! Roughs or finishes holes to exact size in FORG-INGS. CASTINGS, BOILER PLATE, THIN STOCK, TUB-ING: CROWNED, CYLINDRI-CAL AND FLAT SURFACES. One of 3 blades is always in the cut on odd work shapes—smooth action even on intermittent cust! Use new HOLE-MAKERS in radial drills, drill presses, turret lathes, portable electric or pneumatic drills, etc. Excellent for trepanning and rough boring I.D. 5 in Tubing, Castings, etc... areal production too!!

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Holes can't drift, spindle can't deflect-it's piloted 2 ways!

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| Models:   | 102      | 203      | 304      | 405      | 506      |
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The precision of a machine tool plus the durability of a workhorse. Complete with 1/2 H.P. Heavy Duty Motor and auto-

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OTHER STYLES AND SIZES IN NEW MANUAL ON FINISHING—WRITE TODAY

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NOW STANDARDIZED for DRILLING, REAMING, TAPPING



9 sizes -

5 combinations per size — for hole patterns 3" through 15" dia.

Standardization makes for quick delivery and attractive price. Only a few minor parts need be made. Speed up machining operations. The operator merely feeds the parts — the Zagar Self-clamping Drill Jig does the rest. Zagar drill jigs are now "off the shelf".

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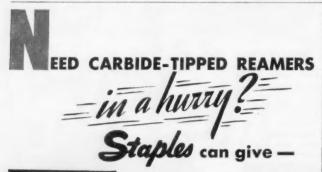
#### Filter Conditions Soluble Oil Coolants and Mineral Cutting Oils

The Barnesdril Kleenall Combination Magnetic and Fabric Tank-Type Filter which employs two principles of conditioning soluble oil coolants and mineral cutting oils has been announced by Barnes Drill Co., 860 Chestnut St., Rockford, Ill. The compact unit is designed to use the widely-known Barnesdril Magnetic Sepa-

rator Drum combined with a filtering area where the coolant passes through a fabric of specific porosity. The fluids are first exposed to the intense magnetic field by passing through a flow channel surrounding the rotating magnetic drum. Ferrous metal particles and entrained abrasive materials are attracted and held by the strength of the magnetic field until they are rotated from the flow channel to a point where they are scraped off and

removed from the system. The coolant then flows to the filtering area where it forms a pool on a supported fabric apron.

The filtering area is designed to provide a mechanical seal at the edges of the fabric and permit a pool of coolant up to 5 in. deep. This head of liquid promotes fast flow through the filter medium. The design permits the filtering area to extend over the full width of the fabric and thus fully utilize all of the fabric surface for filtering. The expended material is, therefore, held to a minimum. The coolant filters through the fabric medium and all non-magnetic particles are retained



48-HOUR DELIVERY

on special reamers that are slight alterations of standard sizes

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on standard sizes of expansion reamers—and solid reamers with straight and spiral flutes

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A complete line of Circular Carbide-Tipped Tools, Expansion Reamers—Special Tools



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If you're looking for longer cam life, lower maintenance costs and higher load capacity, let Rowbottom furnish you cams ground after hardening . . . a service recently made available to all cam users. Send specifications or drawings for estimate.

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Driving assembly is Full Ball Bearing mounted with 3 Bearings on each spindle. Thrust load carried by radial thrust bearings.



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For accurate setting and locating spindle brackets are machined to receive slip-on and slip-off template.

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Models U-608 and U-1000—Ball Bearing Models U-6208 and U-10128—Plain Bearing, 11/16" or 1/2" min. centers

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Semi-Standard Heavy Duty Full Ball Bearing . . 1/2" in Cast Iron—1-7/16" min. centers 7-1/8" or 9-3/4" Dia.

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Also Larger Adaptations and Full Line of Fixed Center Drill Heads.

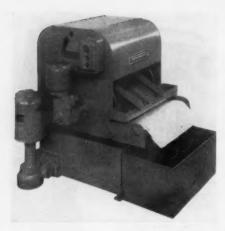
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Also Makers of DORMAN AUTOMATIC REVERSE TAPPERS



Barnesdril Kleenall Combination Magnetic and Fabric Tank-Type Filter

on the surface of the fabric. Fabrics of varying density are available, and the proper type fabric to control the degree of coolant clarity and the flow

rate required can be predetermined to meet any set of conditions. The flow of coolant is controlled by a float mechanism which moves the fabric automatically when the liquid in the pool reaches a predetermined depth. As the fabric moves through the filtering area, the expended material collects the swarf scraped off the magnetic drum and deposits all waste material into a sludge pan for easy disposal. Four models of the unit are available, ranging in capacity from 15 to 60 g.p.m. based on water soluble coolants.

#### Toggle Clamp and Pliers Are Made of Non-Magnetic Material

Lapeer Mfg. Co., 3048 Davison Rd., Lapeer, Mich., has announced the Knu-Vise Model V-400 Toggle Clamp and the Knu-Vise Model P-1200 Toggle Pliers which are constructed of non-magnetic material to eliminate



P. O. BOX 1017-B . CINCINNATI 1, OHIO





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Once you use and compare Sterling stacking boxes, you'll know why we invite comparision in design, construction, and price. Our "Top Rim" construction provides stronger support all around the box . no corner inserts to become loose and fall out. Efficiency in designing and manufacturing allows us to quote favorably on any type or size stacking box.

Write for literature and prices.

Sterling Factory Equipment Co., 183 Charles St., Providence, R. 1.



Sterling "Top Rim" Steel Stack-ing Box with drop handles. Size: 18" x 12" x 6".



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are available in two sizes, large and small, and with both motor and belt drive. Hartford also makes steel burnishing balls scientifically correct in design and material for each specific job. Bulletin on request.

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"THE ORIGINAL MARKING SPECIALISTS"



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Send for new catalog giving complete information on Woodruff keys, taper pins, machine keys and machine racks.

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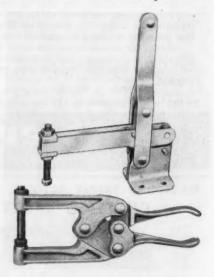
BEAVER FALLS

PENNSYLVANIA

Plents: Beaver Fells, Pa.; Hammond, Ind.

the trouble caused by magnetic attraction and corrosion that are present while spot welding aluminum or working in proximity to acids. The clamp is made from non-magnetic stainless steel, and the portable toggle pliers are forged from non-magnetic K-Monel. Both tools are available in a wide range of sizes and types.

The Model V-400 Toggle Clamp has a channel on which the spindle can



(Top) Lapeer Knu-Vise Model V-400 Toggle Clamp. (Bottom) Lapeer Knu-Vise Model P-1200 Portable Toggle Pliers

slide to permit its positioning anywhere along its length to provide the exact placement of spindle on the work. The spindle, in turn, provides the desired adjustment for height and for clamping force. The recommended force of the Model V-400 is 400 lb. with the spindle located at the end of the channel. The Model P-1200 Pliers have a recommended clamping force of 1200 lb. and present a convenient and efficient portable holding device,

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Finished holes 1½" to 11¾" diameter to a depth of 8" on your present equipment!



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#### Combination Welder and Auxiliary Power Unit

Identified as the "Weldanpower," a combination welder and auxiliary or standby power unit, for maintenance work in building, construction, business and industry, featuring large capacity and simultaneous output of both welding and auxiliary current has been announced by The Lincoln Electric Co., Cleveland 17, Ohio. The

machine is rated as a 200-amp. welder and a 4 kva continuous duty power unit. For intermittent standby power, it is rated at 5 kva. For business and industrial use, the machine supplies a wide range of a.c. for maintenance welding to repair equipment breakdowns, repair worn parts, hardface machine parts to resist wear, make replacement parts, build special equipment, and so on. The machine also

supplies 230/115-volt 60-cycle single-phase a.c. standby power to operate grinders, drills, power tools, pumps, saws and

lights.

The unit is an a.c. alternator powered by a 12h.p. air-cooled gasoline engine. Rigidly coupled to the engine shaft is a four pole laminated steel rotor on which coils are wound. The stator has two separate windings, one for the welding circuit and one for the power supply, so that both power sources are available simultaneously. Accurate voltage control of output ensures efficient operation of electrical equipment. Normal voltages are held constant regardless of load variations. To



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Lincoln "Weldanpower" Combination Welder and Auxiliary Power Unit

produce this near flat or constant voltage regulation from no load to full load, the separate field exciter has two compound windings and a third series field winding.

For welding, the operating panel provides taps which supply a.c. for use with electrodes ranging from 5/64 to 5/16 in. in diameter. In addition to the tap range of output, a heat control is used to raise or lower the current from any one tap to suit exact requirements of the welding job. A continuous current range from 20 to 200 amperes is thus provided for welding, hardfacing, brazing, heating and soldering. For auxiliary power, the panel provides a 230-volt outlet accommodating a standard three-prong plug and four outlets for 115-volt power for standard two-prong flat blade plugs.

#### High Speed Press Features Conveyor-Type Feed

A high speed press featuring a conveyor-type feed has been announced by The Federal Press Co., 504 Division St., Elkhart, Ind. Operated by only one



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TOOL STEELS for all tools for all purposes

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MODEL 1100

 Capacities No. 0 Machine Screw to 1½ Hand Taps.

## HENRY P. BOGGIS & CO.

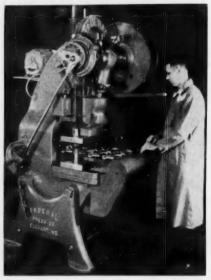
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THE GRANT MFG. & MACHINE CO. 96 Silliman Ave. Bridgeport 5, Conn. operator, the machine is said to be capable of producing up to 7,200 pieces per hour. The press, an open-back inclinable Model 44, has a wide ram and wide bolster plates, thus permitting the use of a wide chain conveyor with 19 pairs of stations. A safety stop mechanism is said to assure perfect alignment at each work station and also functions to stop the press in case of jamming or misalignment, thus preventing possible damage to equipment and dies.



Federal High Speed Press with conveyor-type

The operator, in feeding material to the conveyor, works at a safe distance, approximately 24 inches, from the ram. Pressings are automatically ejected from the conveyor and slide into containers at the rear of the press. The press is designed for hard usage and for continuous service. It incorporates an oversize crankshaft, Timken bearings, solid web-type flywheel, symmetrical ram and long gibs and V-ways.

Sensational new VIBRA-FORGE principle assures unbreakable welds every time!

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LITTLEFORD BROS., INC. 33 E. Pearl St., Cincinnati 2, Ohio



### End Dump Truck Has Easily Tipped Hopper

An end dump truck which is said to eliminate the back-breaking effort of tipping the hopper has been announced by The Klaas Machine & Mfg. Co., 4334 E. 49th St., Cleveland 25, Ohio. According to the manufacturer, the contents of the filled hopper can be dumped by releasing a simple lock. Likewise, after discharging, it requires practically no effort to re-



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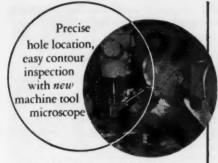
Klaas End Dump Truck

turn the hopper to its original position. The truck can be supplied in a variety of capacities without impairing the dump-return facility. The unit is furnished with wheels or a pallettype skid base for use with fork lift trucks. Another option is a flange on either side along the top edge of the hopper for transporting by means of overhead handling equipment. Made of thick gauge metal, the truck is constructed to specifications.

#### Full Universal Table Available for Carlton Radial Drills

A full universal table for Carlton radial drills has been developed by The





- Wide field of view (1/4"); 30x magnification
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SAVES TIME—Click! one tool's out. Snap! another's in. With an AMF Wahlstrom Chuck there's no waiting for the spindle to stop! Simple hand motions do the job. No more keys, collets or wrenches to fit or to hunt for SAVES MACHINES — A single-spindle drill press equipped with an AMF Wahlstrom Instant-Change Chuck does the work of several! Makes it practical to drill, ream and counterbore different size holes without moving the work.

SAVES TOOLS — Does not chew up shanks of costly tools. Wahlstrom's four hardened and ground jaws grip without slip . . . the greater the load, the tighter the grip. Drill on left is still unmarred after 289 changes in an AMF Wahlstrom chuck.



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WAHLSTROM/FLOAT-LOCK SALES DEPT.

AMERICAN MACHINE & FOUNDRY COMPANY
Room 23, 261 Madison Ave., New York 16, N. Y.





Carlton Full Universal Table

Carlton Machine Tool Co., Cincinnati 25, Ohio. The table has a 32-in. round top and is mounted on anti-friction bearings for easy operation. According to the manufacturer, the table provides a fast, convenient setup for drill-

ing compound angles which heretofore required a more complicated arrangement. The table can be used on any Carlton radial drill.

#### Spray-Coolant System Eliminates Dry Grinding

Identified as "Spra-Kool," a system for quickly applying spray-coolant to any type of dry grinding or polishing operation, as well as certain drilling, milling, chamfering or boring operations that do not require flood coolant, has been announced by Bar Products Co., 3703 Higherest Rd., Rockford, Ill. The system is designed with a simple valve and spray nozzle which are said to provide a steady, uniform jet spray of coolant to tools and work. The fine spray, it is claimed, prevents dust and efficiently dissipates heat from the work, allowing continuous grinding without burning, heating or warping. Cooling action of the spray-



## With ball-bearings that never require re-lubrication.

## BALDOR ELECTRIC COMPANY

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AND

coolant combines the advantages of rapid evaporation and forced air jet penetration at the point of workwheel contact.

The Spra-Kool mechanism is designed for quick setups and easy use. A length of hose is attached to any air line, the nozzle is positioned to the work and the spray control is adjusted to provide maximum cooling results. There are no pumps, settling tanks or complicated filters. No splash guards or drain pipes are needed since any excess spray evaporates quickly. The amount of coolant applied is easily varied either by adjusting the air pressure or raising or lowering the siphon level of the coolant. Operation is said to be unaffected by sudden or varied drops of air pressure. According to the manufacturer, the system is adaptable to any make of machine without special equipment. The complete unit in-



Bar "Spra-Kool" System in use

cludes a 1%-in. capacity adjustable clamp, full universal knuckle, air control valve, spray nozzle, 4 ft. of air hose, 3 ft. of rubber tubing and a gallon container.



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Throw away your cold chisel and whisk off weld spatter with a dry rag! Protect-O-Metal spatter-proofing compounds make weld cleaning a breeze. Improve your welds at the same time . . . P-O-M compounds quiet the arc, improve fusion and electrode operation, prevent oxidation and annealing scale, cause no porosity. No smoke, odors, or fumes.

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G. W. SMITH & SONS, INC. 5407 KEMP ROAD, DAYTON, OHIO



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THE BORING AND FACING HEAD THAT THINKS FOR ITSELF

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Cut costs of Removing Broken Taps

Universally used for removing stubborn, balky taps that break off deep in threaded work. Quick, easy, inexpensive. Will not damage threads. In 2, 3 and 4 flute styles—sizes No. 4 to 1½".

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Many holders in one. Head will swivel around an entire circle. May be set for straight, right or left hand offset positions. Will hold with perfect grip any size square or round tool bit or boring bar from 16" to 7/16".

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Reduce Labor Costs for Removing Pipes, Studs and Screws.



For removing broken pipes or studs that defy movement. "Reps" makes a strong four point grip without hammering or pounding. Hardened steel. Pulls rather than reams. In sizes, for every pipe from 1/8" to 2", every stud and screw from 3/8" to 31/4".

## (\*Reps. Tool Company, Inc., a Walton affiliate.)

Sold by leading dealers, or write direct for catalog No. 10 of Walton Tools and details of 30 day free trial offer.

THE WALTON COMPANY, Hartford 10, Conn.

### Universal Vacuum Chuck Holds Compound Angles

O. S. Walker Co., Inc., Worcester 6, Mass., has announced the development of a universal vacuum chuck for holding compound angles, such as used in the aircraft industry. According to the manufacturer, the distribution of rapid vacuum affords immediate holding and eliminates the possibility of vacuum applied in one section. The vacuum is activated with



Walker Universal Vacuum Chuck

limit switches to stop all machining before the vacuum diminishes to a dangerous point. A safety feature

is provided in tell-tale lights denoting the approach of diminishing vacuum.

### YESTERDAY'S PIONEER . . . TODAY'S LEADER



## WELDON

## Stub Length Double-End End Mills

#### Stock Items

This line of small size end mills, in both double-end and single-end, with flutes shorter than regular, provides the following advantages:

## GREATER STRENGTH • LONGER TOOL LIFE FAR LESS BREAKAGE • FASTER FEEDS

Furnished in 2- and 4-flute styles

Weldon distributors throughout U. S. A. and Canada carry complete stocks to serve you

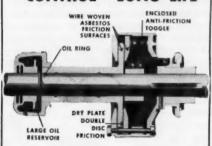
## THEWELDONTOOLCOMPANY

3000 WOODHILL ROAD ... CLEVELAND 4, OHIO

### Retaining Ring Dispenser

dispenser which automatically feeds three Waldes Truarc crescent or Eshaped retaining rings at one time has been introduced by Waldes Kohinoor, Inc., 47-16 Austel Place, Long Island City 1, N. Y. Intended primarily for use with assemblies which more than one ring must be mounted, the dispenser has been designed to hold three rods of stacked rings mounted side by side on a standard Truarc dispenser base. The rings are withdrawn by means of a special ap-

## **FAST ACTING -- POSITIVE CONTROL -- LONG LIFE**



This time-tested clutch provides maximum power transmission at lowest cost. For specifications and prices on wide range of sizes, write for Bulletin No. 25M. Brown Engineering Co., 120 N. Third St., Reading, Pa.

BROWN MULE PULL CLUTCHES



## MAKE SET-UPS FASTER --

Conserve valuable production time by using the fully universal, easily-operated MASTER MULTI-SWIVEL VISE for intricate, angular set-ups in your shop. Three swivels instantly set any compound angle. Used in shops throughout the world. Interchangeable platen optional.

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82 Block Set \$275.00 Complete

This Set will supply the needs of any discriminating shop that must work to gage-block precision.

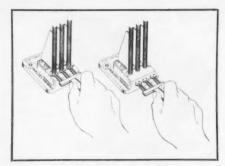
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**SCHERR** CO., Inc.

200 MM LAFAYETTE ST. . N.Y. 12, N.Y.





Waldes Truarc Triple-Stack Retaining Ring Dispensers

plicating tool which has three fork heads set into a standard applicator handle. Both the dispenser and applicator must be engineered for individual applications.

The unit is similar in construction and operation to the standard dispenser. Three standard bracket assemblies, each consisting of a bracket and spring rail, are fastened with remov-

able round-head screws to a standard base. A special shim plate with a large opening to accommodate the three stacks is used between the bracket assemblies and the base. Standard stack rods are used to hold the retaining rings. The procedure for loading the rings into the dispenseris the same as for the single-stack units. The tongues of the stack rods are locked in place in the grooves at the top of the spring rails. The rings are then permitted to slide down the rails to the base. With its ring-gripping recesses face down, the applicating tool is placed in contact with the surface of the base and pushed forward in the shim plate opening until the fork heads grip the bottom ring in each stack. The applicator is withdrawn, the rings are mounted one after the other and the operation is repeated. The stack rods may be removed by lifting them out of the grooves in the spring rails.

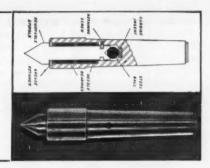


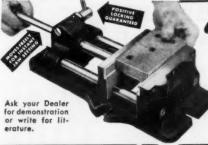
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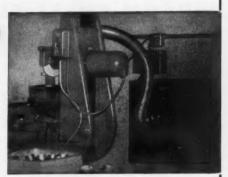
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Ask for Catalog 605-2. Describe dust problem for recommendation by return mail—no obligation.



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207 Main St. Ann Arbor, Mich.

#### Tools Deburr and Chamfer Both Inside and Outside Diameters

Two companion tools, identified as "Nobursink" and "Noburod," for the fast, efficient and economical deburring and chamfering of both inside and outside diameters have been introduced by Nobur Mfg. Co., 717 N. Victory Blvd., Burbank, Calif. The "Nobursink" for openly accessible hole faces and "Noburod" for the outer ends of rods, tubes and bosses, have a low torque design which is

said to permit rapid off-hand work-piece handling without chatter or development of secondary burr, even on large diameters. Controlled cutter entry, it is claimed, prevents snagging, seizing or excessive cutting. Both tools employ a unique two-piece construction, permitting cone faces to be cylindrically ground on a tool and cutter grinder or on any lathe with a tool post grinder. Half members are then locked in a displaced position to provide automatic radial relief.

According to the manufacturer, the tools will work equally well on all metals, and the range of ap-

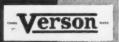
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VERSON SHEET FLOATER

By magnetic action, the Verson Sheet Floater ends the problems of hand separation in the feeding of sheet steel to presses, brakes and shears. Sheets formerly difficult to get ahold of are quickly and easily separated by the Sheet Floater—ready for the workers' grasp. Available in two models—Standard and Heavy Duty. Either model will handle rectangular, round or irregular shaped pieces. Write today for further information and prices.

A Verson Press for every job from 60 tons up.



VERSON ALLSTEEL PRESS CO.

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(Left) "Nobured" and (right) "Nobursink" Deburring Tools

plication extends from less than 18 in. hole size up to the body diameter. The tools are furnished with 90-degree included angles, are made of high speed steel and are carefully heat treated and precision ground.

For metal bending . . . your best bet is the

URVETTE



EXTREMELY ECONOMICAL QUICKER SET-UPS

- Precision bends 1/4" basic wire, 3/4" x 1/8" strip, channel, tube, bar, angle.
- Forms without damage.
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\* TRADE MARK Reg. U.S. Pat. Off.

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HILLSIDE, N. J.

# STOP

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shows how to prevent excessive drill breakage, vastly prolong drill life . . . and eliminate time wasted by valuable skilled mechanics grinding drills!

Black Diamond's "Positive Positioning" feature positions drill to exact twist you want . . . automatically. Now anyone can sharpen and web-thin with scientific accuracy . . . on a Black Diamond Drill Grinderl

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## **BLACK DIAMOND**

Saw & Machine Works

Natick, Mass. 71 North Ave.

September, 1954

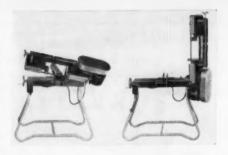
MODERN MACHINE SHOP

343

#### Band Saw May Be Used in Vertical or Horizontal Positions

Designated as the New 49A, a dualpurpose metal-cutting band saw which is designed for use in either a horizontal or an upright position has been developed by Wells Mfg. Corp., 808 Tyler St., Three Rivers, Mich. According to the manufacturer, the portability and versatility of the machine make it ideal for the small shop, "on the job" work or as a utility unit in





Wells New 49A Dual-Purpose Metal Cutting Band Saw shown in horizontal and vertical positions

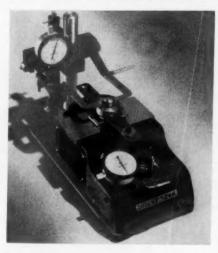
large shops. By swinging the cutting head into a vertical position, the machine is ready for use as a utility upright band saw for cutting slots, angles, bevels, notches or contours. As a horizontal cut-off saw, the unit has a capacity of  $3\frac{1}{2} \times 6$  in. (rectangular) and  $3\frac{1}{2}$  in. diameter (rounds).

The blade, ½ in. x 0.025 in. x 5 ft., is driven by a ¼-h.p. 115-volt motor, controlled by a manual switch, with automatic shut-off at the end of each cut. The machine has a V-belt drive with selective speeds of 54, 100 and 190 f.p.m. and is equipped with a positive screw-type vise. Disc-type idler and drive wheels run on grease-sealed ball bearings, and the frame and bed are welded steel mounted on tubular steel legs. The bed area of the machine measures 6½ x 24 in. and the height to the top of the bed is 24 inches.



## Bench Type Thread Comparator Gage

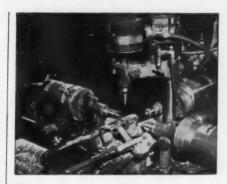
The Bryant No. 21 Bench Type Thread Comparator Gage, which has been placed on the market by Bryant Chucking Grinder Co., Springfield, Vt., affords unusual versatility in checking the size of both internal and external threads with that of a known master. Using hardened tool steel master threads in paired segments which form a collapsing plug, the



Bryant No. 21 Bench Type Thread Comparator Gage

gage is designed for the checking of internally threaded workpieces in sizes between \(^5\_{10}\) and 5-in. diameter and externally threaded workpieces between No. 8 and 5-in. diameter. Standard internal and external thread segments are available from stock in sizes through 1 in. in NC, NF and NEF threads. Segments for other thread sizes are available on application. According to the manufacturer, all segments are made to conform to Class W tolerances.

The collapsing plug feature of the Bryant No. 21 Thread Comparator



## HOW TO DRILL SMALL HOLES ACCURATELY ON A PRODUCTION BASIS

Pictured above is an E-M drill head setup that has been used for years in a large gasoline engine manufacturing plant. Operation starts automatically when the piece is clamped in place. Three cross holes are then drilled followed by a fourth axial drill to size and deburr. Hole sizes range from No. 60 to 50. One man completes all operations at once whereas four separate operations were required before E-M automatic drill heads were used. Production and quality are way up, and stay up year after year.

Perhaps you have a similar operation in your plant that is adaptable to faster, more efficient E-M automatic drilling. There is no obligation for our engineering service.

The outstanding features of the E-M automatic drill heads listed below, can cut your small hole drilling costs to a minimum:

- 1,000 to 10,000 or 2,500 to 15,000 RPM ball bearing motor with instant speed selection insures maximum drill efficiency.
- Super accurate chucking capacity .004" to 5/32" with selected chuck or collets, and vibration-free direct spindle drive provide a true running drill for precision and longer life.
- Positive air feed to spindle with rapid approach to work and completely adjustable hydraulic feed control through the full depth of the work and during breakthrough.
- Guaranteed precision and accuracy results from a decade of service to the field.

PRICE COMPLETELY EQUIPPED \$253.00 and up

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SET-UP CHUCKING DISTORTION

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CYLINDER HONES
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JN-95 Junior Range: 2" to 2.6"





Heavy Duty Range: 4¾" to 20½"

These low-cost hones produce straight, round holes, avaranteed accurate within .0005". They save time and money in thousands of plants on production, machine repair, tool and die work, maintenance and salvage. Whether for roughing out .020" or moreor finishing to a few tenths. Sunnen Hones will do the job quickly and accurately.

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Gage provides for easy entrance into internally threaded workpieces. In the collapsed position, unthreaded portions of each segment override the threaded portion, serving as a guide during loading and unloading. To use the gage, the operator merely presses downward on a hand lever located on the front of the gage, slips the workpiece over the collapsed segments until it comes to rest against a pair of work supports, releases the lever and



Attachment for checking squareness of face with relation to threads. Setup shows method of checking upper face of workpiece in relation to an internal thread.

takes a reading from a dial gage. Similarly, on externally threaded work, the checking sequence is that of load, gage and unload. While in the gaging position, the workpiece requires only a slight amount of rotation against the paired segments in order to obtain an accurate reading. The gage, it is claimed, also lends itself ideally to the checking of any type of internal shape within the range of the gage.

SUNNEN COMPANY

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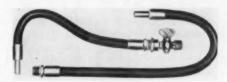
Available for use in conjunction with the Bryant No. 21 Gage is an attachment for checking the squareness of face with relation to the thread. The attachment, as an integral unit, is positioned on a post located on a sub-base to which the thread comparator is fastened.

In operation, one follower arm pivots the entire attachment and thus compensates for thread progression as the workpiece is "threaded" onto the master thread segments. The diametrically opposite contact point is moved as the workpiece is rotated with respect to the other contact point when angularity of the face is present. The relative motion of the two contact points due to angularity is transmitted directly to a dial indicator.

A simple adjustment of a spring stop and reversal of the contact points provide a means for adapting the attachment for checking either an upper or lower face.

### Plastic Coolant Assembly Bends into and Keeps Any Form

Identified as "Flex-Set," a plastic coolant assembly which is said to bend



Couse & Bolten "Flex-Set" Plastic Coolant Assembly

into and keep any shape or form until changed by the operator has been announced by Couse & Bolten Co., Plastics Dept., 42 Lafayette St., Newark, N. J. According to the manufacturer, the hose is totally free from clogging, corrosion and leakage. The set position of the hose, it is claimed, is never altered by vibrations or coolant pressure.

▶ Full Recirculating ● Automatic Precision Heating ● Unusually Rugged



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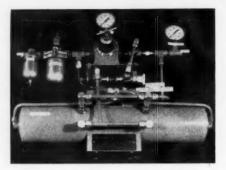
80 to 650° F. (26 to 343° C.)

\$740.00

#### Pneumatic Booster Pump Boosts Input Pressures As Much As 2 to 1

Dayton Rogers Mfg. Co., Minneapolis 7. Minn., has developed a pneumatic booster pump which is said to be capable of boosting input pressures as much as 2 to 1. Working on the differential area principle, the pump is an automatic operating self-contained unit which requires no external power other than the air to be compressed. It can be regulated to supply air at





Dayton Rogers Pneumatic Booster Pump

any pressure between its input pressure and two times this pressure. Any unit to which the pump is supplying air can be regulated at less than input pressure by shifting a knob-operated cutout valve.

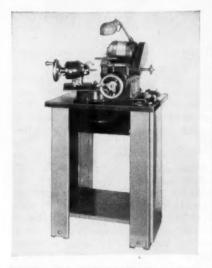
When using a 95 p.s.i. input, the pump will take one minute to boost a 12-gal. tank, precharged at 100 p.s.i., up to 185 p.s.i. The time required to boost any volume under the same conditions to 185 p.s.i. can be obtained by dividing this volume in gallons by 12. All necessary valves, line filter, lubricator and input and output gages are included, all of which are fastened to a common mounting plate.

### Grinder Sharpens Chamfers of Taps

Designated as the "Hybco" Model 1300, a tap grinder especially develop-



ed for tap users who particularly desire facilities for sharpening the chamfers of taps has been announced by Henry P. Boggis & Co., 708 E. 163rd St., Cleveland 10, Ohio. According to the manufacturer, capacities of the machine are from No. 0 machine screw taps to  $1\frac{1}{2}$ -in. hand taps,  $\frac{1}{8}$  to 1 in. pipe taps and right or lefthand threads with various numbers of flutes according to accessories selected. The machine is available with a floor stand or without the stand for



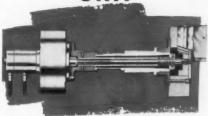
Boggis "Hybco" Model 1300 Tap Grinder

use as a bench machine. Chamfer sharpening heads are made in two sizes to meet different requirements. Each revolution of the wheel grinds and relieves all lands. Relief is controlled by adjusting screws through the back of the head.

## Unit Accurately Indexes up to 500 Positions

Identified as the No. 477, a multiple position indexer which is said to be capable of accurately indexing up to

## SKINNER "JUNIOR" POWER CHUCKING UNIT



## Now! Maximum production speed for your small lathes too!

This Skinner "Junior" unit can be adapted to almost any small lathe with 1'' to  $1\frac{3}{6}''$  hole through the spindle. It is light in weight, precisely balanced to minimize spindle bearing and braking loads, and provides extreme repetitive accuracy on internal and external work.

The Skinner 8" self-centering power chuck has gripping capacity from ¼" to 6". Its ¼" jaw travel exceeds the capacity of any collet, and is particularly valuable on production work where rough or finished holding diameters may vary beyond a single collet's ability to grip.

The Skinner "Junior" unit is complete. It contains chuck, 6" aluminum air cylinder, adapters, draw bar, etc.

Write Skinner or your nearest Skinner distributor for illustrated folder.

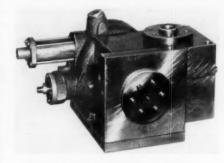


## THE SKINNER CHUCK COMPANY

210 Edgewood Avenue, New Britain, Conn.

500 positions, depending on the gear ratio and index plate ordered, has been announced by Erickson Tool Co., 2303W Hamilton Ave., Cleveland 14, Ohio. According to the manufacturer, the original two minutes of a degree accuracy on Erickson indexers is proportionately reduced by the gear ratio.

A self-contained shock control unit is said to assure positive, fast indexing, regardless of the weight of the workpiece. Since the shock unit can be adjusted to meet varying loads, it is claimed that maximum



Erickson No. 477 Multiple Position Indexer

COMBINATION ROTARY TABLE AND

THE TWO IN ONE

ANGLE PLATE

PRECISION **ACCURACY** 

WORM adjustable from 0 to 90 degrees.

VERNIER control to within

2 seconds of Arc. WRITE FOR FOLDER

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speed can be used without injury to mechanism or work. Over-ride is said to be completely eliminated. The hardened and ground index lock pin operates independently of actuating fluid.

The indexer gearbox turns on the indexer spindle so that the No. 477 can be installed in four different positions for convenient work location. Operation is either by air or hydraulics. The drive spindle has a flange for convenient mounting of workholding fixtures. The unit is recommended for large quantity milling, drilling, tapping, welding and assembly operations where a large number of positions is required.



## **CUT COSTS with ALLEN Punch Press**

1-Ton Power Bench Type . . . Powerful, Dependable, Economical

For light work - stamping, forming, riveting - metal, fiber or other material

material. Overall height 171/2''... Base size  $81/2'' \times 81/2'' \times 81/2''$ ... Die bed  $51/2'' \times 81/2'' \times 81/2'$ 

30-DAY MONEY-BACK GUARANTEE. Order TODAY. Price \$97.50 F.O.B., Clinton, Mo. (Includes Motor bracket, V-belt, motor pulley.)

ALVA F. ALLEN, Dept. MM, CLINTON, MO.

#### Polishing and Buffing Head Accommodates Either a 10, 15 or 20-H.P. Motor

Hammond Machinery Builders, Inc., 1615 Douglas Ave., Kalamazoo, Mich., has announced the Model 52-100 Heavy-Duty Full-Floating Adjustable Polishing and Buffing Head and Stand Unit which is designed to accommodate either a 10 or 15-h.p., 1,750 r.p.m., or a 20-h.p., 3,500 r.p.m. motor. The head's net weight of 2,500 lb. in-



Hammond Model 52-100 Heavy-Duty Full-Floating Adjustable Polishing and Buffing Head and Stand Unit

dicates the rugged construction necessary for heavy buffing jobs and to ensure vibrationless operation. It has a maximum "float" of 6 in. and can be furnished with power feed for vertical lift or horizontal traverse. The head unit, which can be assembled for either right or left-hand operation, was designed especially for use with Strait-Line Automatic Buffing Machines. It can also be used with rotary automatics or as individual polishing and buffing stands similar to polishing and buffing lathes.

## NumberAll

SELECTIVE NUMBERING HEADS

all wheels quick set

Model 83 Heads for all stamping operations requiring quick selec tive numbering.



Wheels are engraved with direct sight figures at front of machine. Set to the required character by turning the knobs. By pushing the knobs right or left anyone of the wheels may be engaged. The indexed wheel selector knob serves as a positive stop for every wheel. 1/16" to 1/4" size figures. Let-ter wheels, with up to 11 letters and a blank on each wheel, can also be supplied. Heads are more efficient and durable than old style lever machines. Furnished in sizes from 1 to 15 wheels.

Write for Bulletin MS-83

NUMBERALL STAMP & TOOL CO. HUGUENOT PARK STATEN ISLAND 12, N. Y

# PRECISION DIAMOND TOOLS

Industrial Diamonds Thread Grinders Turning Tools Engraving Tools Dressing Tools

Diamond Powder Manufacturers of

## DIAMOND WHEELS

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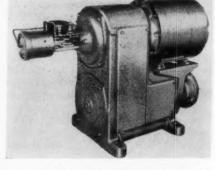
Representatives in Principal Cities

CLIPPER DIAMOND TOOL CO., INC. 21-C W. 46 ST. NY 36



#### Motor Drive Control Provides Accurate Means for Automatic Process Control

Reeves Pulley Co., Columbus, Ind., has announced the availability of an auto-pneumatic control with "linear" output speeds for its Vari-Speed Motodrive in all sizes of fractional and integral h.p. capacities. The control is said to provide a more accurate



Reeves Vari-Speed Motordrive equipped with Auto-Pneumatic Control

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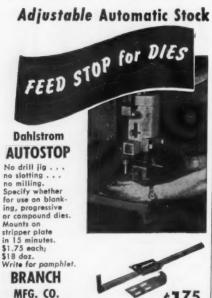
Dept. M, R.F.D. No. 1, Char

Chardon, Ohio

diustable Automatic Stock

means for automatic process control by continually correcting operating speeds for changes in material and/or energy variations of a process, thus compensating for changes in temperature, liquid level, pressure, heat, flow, color, velocity, peripheral speed, tension, and so on.

The unit is simply a valve positioner and a pneumatic piston that is connected to the speed shifting mechanism of the motor drive unit. Any change in the position of the piston automatically changes the output speed of the motor drive. The position of the piston is determined by the valve positioner which is operated from the 3 to 15 p.s.i. signal that is sent from any instrument control. Each minute change in instrument air pressure is transmitted to the po-





NORTH BRANCH,

MINNESOTA

sitioner and actuates a definite increment of r.p.m. change on the Motodrive output shaft.

#### Combination Attachment Has Capacity for 1/4-Inch Drill and 5/16-Inch Tap

Errington Mechanical Laboratory, Inc., Staten Island 4, N. Y., has introduced the Errington Tap-Drill Attachment, a combination attachment for drilling, countersinking, reaming, counterboring and tapping, all on one drill press spindle without the need for the operator removing his hand from the drill press feed handle. The work is simply slid under the head from one spindle to another.

The attachment features a builtin automatic reversing tapping spindle; hardened and ground spindles; gears that are turned on spindles (not pinned on); and heavy duty grooved ball thrust bearings. The at-



Errington Tap-Drill Attachment

tachment has a capacity for up to 1/4-in. drill and 1/6-in. tap and is available with 2, 3 or 4 spindles, which are spaced to handle work up to 51/2 in, outside diameter.

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| 2000°      | 12" x 8" x 18"<br>12" x 8" x 24"<br>12" x 8" x 36"<br>15" x 12" x 30" | \$1030<br>to<br>\$1485 |

All prices are less controls. Any standard controls available for automatic temperature control.

- Cooley modern design provides natural convection— increases uniformity. Heavily insulated large area door makes for low heat loss—reduced power needs.
- Natural thermal convection.
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# SUPER FINISH OF UNIVERSAL DRILL BUSHINGS

reduces tool wear



One sure way to cut excessive tool wear in your operations is to specify Universal Drill Bushings because their superfinish bores help reduce wear on production tools to an absolute minimum, especially in close tolerance work. The blended radius on the top inside diameter helps prevent tool hang-up and breakage, 100% concentricity and hardness tests insure accuracy, uniform high quality and long life. Knurled heads provide a quick, sure grip. Universal Drill Bushings are produced in a complete range of standard sizes and lengths. Orders for special dimensions will receive prompt attention. For complete information, write to the office nearest you-Universal Engineering Sales Co., 1060 Broad St., Newark 2, N. J.; 5035 Sixth Ave., Kenosha, Wis.or our home office.

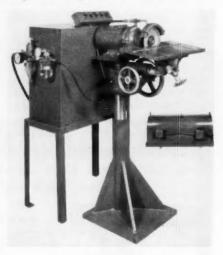
#### UNIVERSAL ENGINEERING COMPANY

Frankenmuth 9, Michigan

171-B

#### Machine Rough and Finish Grinds Single Point Carbide Tools

Designated as the Hi-V, a carbide grinder which is specifically designed for the very rapid rough and finish grinding of single point carbide tools has been announced by Metalloid Equipment, Inc., Box No. 666, Huntington, Ind. According to the manufacturer, the machine possesses the unusual ability to remove carbide at very high rates without introducing stress into the carbide matrix. The table is adjustable to accommodate any desired geometry and provides a



Metalloid Hi-V Carbide Grinder

protractor which can be easily read from the grinding position. A vertical table adjustment also allows the tool to be ground at the center line of the wheel.

Two spindle speeds are provided. For maximum stock removal, a high speed of 10,800 r.p.m. is used and for grinding radii, a low speed of 3,600 r.p.m. is available. Either speed, in either direction or rotation, may be instantly selected by readily accessible push buttons on the control panel.

#### Machine Stamps Practically Any Size Round Part

Designated as the Model GRD-950-1, a machine for stamping the periphery of tubing, bushings, collets and other round pieces has been developed by M. E. Cunningham Co., 1051 Chateau St., Pittsburgh 33, Pa. Claimed to stamp almost any size of round part, the unit consists of four primary elements-a cast steel base with side flanges for bolting to a bench; an arbor for holding the pieces to be marked; a roller marking die; and a gearmounted handle. When the handle is turned, the gear arrangement causes the die to rotate with the piece held in the arbor, with the lettering rolling into the part.

The roller marking die may be either solid or insert style. Type capacity depends on the size of character to be used. Either single characters or logotypes may be fitted into insert



Cunningham Model GRD-950-1 Marking

style dies. Arbors are furnished for any size of tubing; however, it is not necessary to use a different arbor for every inside diameter size.

Needle bearings are used with all moving parts on the machine. A fine screw adjustment is provided to allow

# APEX INSERTED-BLADE TOOLS

## "APEX" Heavy - Duty Cutters In Stock

We carry stock cutters for face milling, slotting or straddle milling. Your inquiries invited.

"APEX" manufactures inserted tools and milling cutters of all styles. Carbide-tipped cutters furnished when required.



APEX TOOL & CUTTER CO., Inc., Shelton 15, Conn.

for setting depth of impression, and set screws lock the unit in position after it is set up for pieces to be marked.

#### Aluminum Locknut Meets Steel Requirements and Is 65 Per Cent Lighter

Designated as the Flexloc 105 F S. an all-metal, self-locking locknut made of high-tensile aluminum which meets or exceeds minimum tensile re-

quirements for steel nuts has been developed by Standard Pressed Steel Co., Jenkintown 22, Pa. While the one-piece aluminum nut has the torque and strength characteristics of a standard all-steel nut, it weighs 65 per cent less than steel. Ideally suited for aircraft structural assemblies, the aluminum nut is for use on steel bolts or studs wherever weight is a factor and temperatures do not exceed 250 deg. F. The nut is made of 24ST aluminum, is chemically treated

> against corrosion and is blue-dyed for identification.

> The aluminum nut has the same self-locking fea-



SPS Flexloc 105 F S High - Tensile Alumi-num Self-Locking Nut

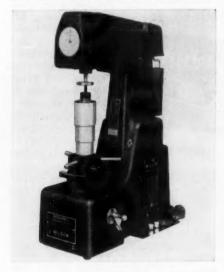
ture as the company's steel Flexlocs. Spring tension of resilient segments of the locking section lock the nut securely at a desired position whether it is seated or not. It. can be reused without loss in locking efficiency. The 105 F S nut is available in five sizes; namelv. 6-32, 8-32, 10-32, 1/4-28 and 1/6-24.



349 Midland Avenue • Detroit 3, Michigan

#### Motorized Harness Tester Is Semi-Automatic in Operation

Designated as the Model Y, a "Rockwell" motorized hardness tester which is semi-automatic in operation has been announced by Wilson Mechanical Instrument Division, American Chain & Cable Co., Inc., 230-G Park Ave., New York 16, N. Y. According to the manufacturer, the device features a short test cycle to permit an increased number of Rockwell



Wilson Model Y "Rockwell" Motorized Hardness Tester

readings to be taken and recorded within a definite time period. The motor's function in the test cycle is to remove the major load. The cycle of major load operation is said to be less than two seconds. Its application is controlled through a dash pot which provides infinitely variable speed control. Power is supplied to the unit from a 110-volt 60-cycle single-phase a.c. line.

The instrument features an illuminated dial gage, indenter light and a "Set-O-Matic" dial gage. The latter



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We specialize in Screw Machine and Centerless grinding service not readily available from many sources.

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Perhaps you've had difficulty in getting a specific job done properly—promptly—at low cost. Bring your problems to Porter. Send Porter your specifications on Screw Machined Parts you buy outside your plantand Porter will submit a precise quotation. Tell us exactly what you want—and we'll prove that you get it done better—at less cost when you depend on Porter. Our knowhow gained in 25 years' experience will save money for you.

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PORTER MACHINE CO., INC. 3100 ENYART AVENUE CINCINNATI 9, OHIO

gage automatically returns the large hardness indicator pointer to zero when the minor load is applied. The unit is furnished with a 16-in. steel ball penetrator chuck; complete set of anvils; and dead weights for applying 60, 110 and 150 kg. major loads. It is equipped with two B scale and two C scale test blocks and a vinyl plastic overall cover. The hardness tester occupies a bench space of 12 x 20 inches.

#### High Precision Tungsten Carbide Rotary Cutting and Grinding

Elgin National Watch Co., Elgin, Ill., has announced a line of precision tungsten carbide rotary cutting and grinding tools, marketed under the trade name "Golden Circle," which are designed for the finishing of close-tolerance tools, dies and other mechanical parts.

The tools include a complete range

of shapes, sizes and cutting actions for all types of material, finishes and processmethods. ing Burrs and files are available in seven shapes plain cylindrical. ball nose, ball, egg shape, tree shape with radius end, tree shape with pointed end and cone. The burrs and files can be supplied in either tungsten carbide or high speed steel: hand ground, machine ground or file cut; and in center-fluted or segment - fluted design.

Also included in the line are miniature carbide cutters for extremely close tolerance work, solid carbide end mills, carbide grinding burrs standard chatterless countersinks.



for all kinds of shop work including die sinking, polishing, reaming, grinding and similar jobs. They're quickly and easily coupled to any electric motor with 3/8" or 1/2" diameter spindles.

They come in two sizes. The 700 Series for precise, delicate work use .092" shank diameter tools. The 500 Series for heavy duty service use tools with shank diameters up

WRITE FOR THIS CATALOG. CATALOG T-51 describes Flexarms and many other S. S. White tools for industry. Send for your copy today.



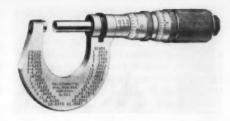
Dept. 55, 10 East 40th St.

NEW YORK 16, N. Y.

Western District Office . Times Building, Long Beach, California

#### Micrometer Reads Direct in Ten-Thousandths

Designated as the No. 221 "Hi-Precision," a micrometer caliper which reads direct in ten-thousandths of an inch and which makes every measurement with exactly the right spindle pressure has been announced by The L. S. Starrett Co., Athol, Mass. The micrometer features a thimble which consists of an inner thimble reading in thousandths and an outer thimble with large, widely spaced graduations that provide direct readings in tenthousandths of an inch. Using the micrometer conventionally, the measuring faces are brought up snug to the piece being measured, and then "loaded" by continuing to rotate the outer thimble through approximately nine to 10 divisions. The outer thimble is permitted to return under spring tension until the 0.001-in. graduation on the inner thimble lines up with the reading line on the sleeve. The 0.0001-



Starrett No. 221 "Hi-Precision" Micrometer Caliper

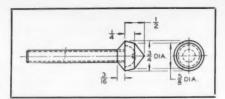
in. reading is taken directly from the outer sleeve. Accuracy throughout the range of the instrument is said to be within 0.00005 inch. The range of the micrometer is from 0 to 1 inch.

Other features of the instrument include satin chrome finish, hardened and ground spindle, lapped anvil and spindle faces, quick-reading graduations and convenient decimal equivalents on the frame. The micrometer is also available with carbide spindle and anvil faces.



#### Pressure Foot Is Diamond Point Rubber Tipped

A one-piece pressure foot, in which a diamond point rubber tip is molded to a full length threaded  $\hat{\gamma_0}$ -in. machine screw, has been announced by West Point Mfg. Co., 26923 W. 7 Mile Rd., Detroit 19, Mich. According to the manufacturer, the pressure foot ensures rigidity in applying pressure to the workpiece. The pressure foot is said to be adaptable for use with Wespo Toggle Clamps and can be used



Drawing of Wespo Rubber-Tipped Pressure Foot

for clamping in unrestricted areas, corners and restricted areas, on aluminum and other light materials

and for pressure applications on polished surfaces.

#### for clear, accurate



WAGNER DISTRIBUTION TRANSFORMER

For complete details on the Automark, the world's only metal marking electric typewriter, WRITE TODAY for Bulletin 8-16. of the marking are the features that make it superior to the method previously used," say officials of Wagner Electric Corporation, St. Louis, about the Automark.

This unique detail marking may

This unique detail marking machine employs a standard typewriter keyboard. Light touch on key produces mark by instantaneous electrical response. Production speeded, operator fatigue lessened. Heavy-duty table. Wide range of plate size and thickness. Type sizes from 1/16" to 3/4".

DEFIANCE MACHINE & TOOL COMPANY
1924 South Vandeventer Ave. • St. Louis 10, Mo.

#### Diamond Holder for Use on Surface Grinders

Designated as the DH-15, a diamond nib holder to be used on surface grinders, which allows the nib to be brought in contact with the wheel at a 15degree angle. thereby restoring the accuracy to cutting action of the grinding wheel, has been announced by The Desmond-Stephan Mfg. Co., Urbana, Ohio.

The holder, it is claimed, allows for hand turning of the nib, thereby constantly maintaining a point on the diamond. The unit can be bolted di-



Desmond-Stephan DH-15 Diamond Nib Holder

rectly to the table or used on a magnetic chuck. It is made of solid steel, weighs 2½ lb. and can be used with any size diamond nib for use on any size grinding wheel.

#### Milling Cutters and End Mills

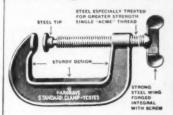
Augmenting its line of taps, dies, reamers and screw plates, Butterfield Division of Union Twist Drill Co., Derby Line, Vt., has announced a series of milling cutters and end mills of the styles shown in the accompanying illustration.

Recently, Butterfield Division also introduced a complete line of drills, as well as high speed counterbores and spot facers with interchangeable pilots.

Butterfield Milling Cutters and End Mills



# STANDARDIZE with HARGRAVE Standard® Carriage Clamps



- The "Standard" of industrial plants—a size for every production application.
- Only Hargrave Industrial Clamps are "Load Tested" at the factory to prevent structural failure in use.
- The No. 540 Hargrave "Standard" Carriage Clamps furnish unusual strength with exclusive construction—stronger than conventional malleable iron—yet priced competitively.

ASK YOUR INDUSTRIAL DISTRIBU-TOR for additional details on these DIFFERENT clamps for industrial use. Also request a copy of the new HARGRAVE Catalog No. 65 furnishing selection - application information in easy to use form.

#### THE CINCINNATI TOOL CO.

1947 WAVERLY AVENUE CINCINNATI 12, OHIO



#### "Bor-Dril" Process Provides for Straight Accurate Holes from Solid with Good Finish

Ex-Cell-O Corp., Detroit 32, Mich., has announced the "Bor-Dril" Process for machining holes from the solid, especially those too long for single-point boring applications, and holes in which it is difficult to maintain finish size. Bor-Dril operations use gun-type drills on standard Ex-Cell-O precision boring machines, way ma-

## JIG BORING

and

Large Precision Machining

Done to your specifications

We Have 13 Jig Borers

#### KIDDE PRECISION TOOL CORP.

37 FARRAND ST. BLOOMFIELD, N. J.



No. 1 cuts up to No. 11 gauge strip or sheet No. 2 cuts up to 1/4" steel plate. BREMIL MFG. CO. 1020 Holland St., Erie, Pa.



Ex-Cell-O Style 112-C Precision Boring Machine equipped for the "Bor-Dril" Process

chines or on special machines arranged either horizontally or vertically. In the process, the drills usually rotate and the work is stationary. This arrangement has two important advantages. First, the part need not be cylindrical, or even symmetrical, but can be any size or shape. Second, since the part does not rotate, it can be clamped in a simple fixture instead of a chuck. However, on small symmetrical workpieces it may be more practical to rotate the part instead of the drill.

The process requires coolant oil under high pressure directed through the drill. The coolant not only forces the chips out the single flute, but also carries away heat. According to the



## Flash! APPRENTICE BOY DOES MOST DIFFICULT FORM DRESSING

WITH AUTOMATIC ANGLE TANGENT TO RADIUS DRESSER.

By simply turning a handle, the most difficult profiles, either concave or convex, composed of angles absolutely tangent to a radius, can be dressed AUTOMATICALLY. Also, any combination of angles or arcs.

Write for Price and Folder.

Dealers' Inquiries Invited.

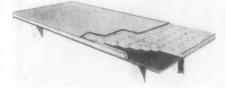
JEON MANUFACTURING COMPANY
Post Office Box 6750 Washington 20, D. C.

manufacturer, the Ex-Cell-O precision boring machine is ideally suited to the process as it is rigid, has smooth and easily adjustable feeds, has vibration-free spindles capable of rotating either the drill or the part at high speeds, and is adaptable for multiple spindle arrangements.

#### Work Bench Top Is Tough, Warp Free, Smooth and Splinter Proof

Designated as the "ShopTop," a heavy-duty industrial work bench top which is said to be tough, warp free, smooth and splinter proof has been announced by Rock Island Millwork Co., Resinwood Division, Rock Island 6, Ill. The top is made of select kilndried blocks, bonded under pressure and heat to provide a durable warpfree core construction, and is surfaced with %-in. Resinwood. A special coat-

ing is said to resist acid, alkali, oil and grease and gives a tough work surface. The top is the color of natural wood to augment work visibility.



Rimco "ShopTop" Heavy-Duty Industrial Work Bench Top

The top is available in 1¾ and 2¼-in. thicknesses, in five widths ranging from 24 to 48 in. and in six lengths ranging from 24 to 96 in. Facilities for precision joining mutiples of sizes can be supplied on special order. Special sizes and thicknesses may also be obtained.

#### So many standard styles . . . . . one must be just right for you!



For more than 66 years we have been producing metal-working tools and adding to our standard line. Our aim was, and is, to have the tools you need immediately available when you need them—at regular low, standard prices.

Today we keep such an extensive range of styles and sizes of PUNCHES and DIES on hand that we can fit most makes of hand, foot, and power operated punch presses from stock.

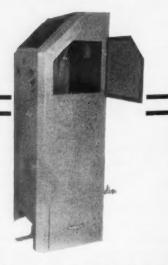
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T. H. LEWTHWAITE MACHINE CO., INC.

317 East 47th Street New York 17, N. Y.

## LEIMAN

## SANDBLAST-CABINET TYPE



· Continuous abrasive feed. All metal cabinet. Doors on either end. Foot or automatic control. Portable ceramic nozzle uses any type abrasive. To protect the operator's hands, the two arm holes are furnished with rubber gloves.

Ideal for cleaning and finishing metals, molds, forging, plastic, etc., removing burrs, carbon, rust, grime, paint, etc., stenciling letters, monograms, trade marks, etc.

Operates on 5 to 100 lbs. or more air pressure.

Extra large viewing glass allows full vision of interior of cabinet.

> Write for descriptive literature and price list.

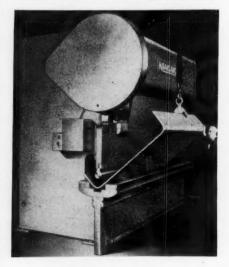
## BROS., INC.

49 CHRISTIE ST.

NEWARK 5, N. J.

#### Press Brake Line Is Adaptable to Various Forming Operations

Practically limitless is the scope of forming, bending, punching, blanking and related operations that can be performed with the versatile 50 to 775ton press brake line introduced by Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, N. Y. To assure uniform bends with straightedge accuracy, double end twin drives with double reduction gearing pro-



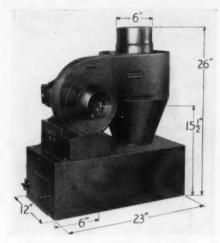
Niagara Press Brake

vide uniform, constant application of power in all models. Rugged, streamlined frames feature box type crowns to provide maximum resistance to deflection and permanent alignment of bearings and rams. Laminated nonmetallic ways are said to reduce wear to a minimum. All gearing is totally enclosed in sealed oil baths.

#### Compact Unit Collects Dust and Removes Toxic Gases

Designated as the Model 5N20 "Dustkop," a compact, self-contained dust collector for exhausting cleaned air and toxic gases outdoors has been announced by Aget-Detroit Co., 207 Main St., Ann Arbor, Mich. Designed especially for the control of dusts from individual dust creating machines or those remotely located from a general dust control system, the unit is rated at 558 c.f.m. on a 4-in. inlet. A multiple blade paddle wheel fan, of the self-clearing type directly driven by a continuous-duty 1/3-h.p. motor, permits the collector to be used even where dusts having fibrous content of considerable length are present.

Dust, centrifuged out by the cyclone separator which is an integral part of the unit, is retained in the dust compartment which comprises the entire base of the collector. The cleaned air, together with any toxic gases, smoke and obnoxious odors, is exhausted outdoors through a 6-in. diameter exhaust connection at the top of the cyclone. The compactness of the unit



Aget-Detroit Model 5N20 "Dustkop" Dust Collector

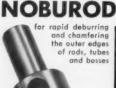
is said to permit it to be used where several dust sources require control on an alternate basis. The collector can



OLIVER MACHINERY CO., Grand Rapids, Mich.

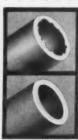


NOW . . . a new principle . . . a new approach to rapid DEBURRING and CHAMFERING of inside and outside diameters





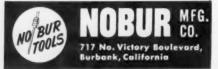
#### ... NOBURSINK





Companion tools—to provide greatly improved work quality, faster and easier than ever before. Low torque design permits rapid off-hand work piece handling without chatter—even on large diameters. Both tools work equally well on all metals. Will accommodate a wide range of work size. Furnished 90° included angle (produces 45 chamfer).

WRITE TODAY FOR FULL DETAILS!



be furnished caster mounted for maximum portability and with quick-acting clamps for connecting to dust source and to exhaust outlet.

#### 2-Ton Press Is Ideal for Small Stampings

Designated as the Model 00, a press which has a 2-ton capacity has been added to the "Press-Rite" line of presses by Sales Service Machine Tool



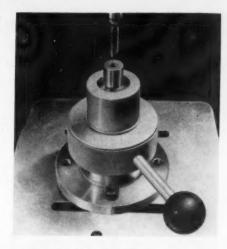
"Press-Rite" Model 00 Press

Co., 2355 University Ave., St. Paul 4, Minn. Heavy-duty construction is used throughout, making the press ideal for small stampings, especially single pieces. It is also said to be ideal for the jewelry trade and for secondary or assembly operations. A single trip safety mechanism is provided as standard equipment; however, this may be easily and quickly changed to continuous operation. A heavy-duty inclinable frame, gib adjustments on both sides, bronze wear strips in ramway, bronze bushed flywheel and main bearings and connecting rod are all standard features of the machine.

#### Collet Chuck Has 1-Inch Capacity

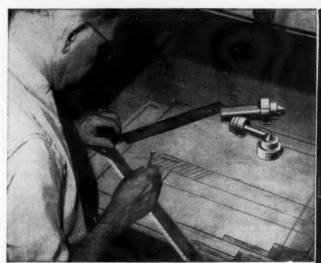
Royal Products, 87 Union St., Mineola, Long Island, N. Y., has announced the "Regal" 5C Collet Chuck which has a maximum 1-in. capacity and which uses standard 5C collets that can be used on small lathes, such as 9-in. South Bend, 10-in. Atlas, 10-in. Logan, 10-in. Sheldon and other lathes and machines.

According to the manufacturer, the chuck has outstanding precision features which make the chuck as concentric as the bearing of the lathe or machine and eliminates errors of the spindle and collet sleeve. Ball bearings permit ease in applying maximum holding pressure. The chuck can also be used as a holding fixture on drill presses, horizontal and vertical milling machines, jig borers, and so on. The removable handle for fixture work requires only a quarter turn to



Royal "Regal" 5C Collet Chuck in use

tighten or loosen the workpiece. All parts are hardened and ground.



Engineered Live Centers . . A properly designed Live Center is one of the fundamentals of setting up a job and requires a specialist's experience. Characteristic of the design of all STURDIMATIC LIVE CENTERS is a low overhang and a slight cushioning action that compensates for expansion due to heat shock and excessive thrust loads—reducing wear to a minimum. Send us your blueprints and specifications—we will see that your job is set up with the right Live Center. Standard shanks with Morse toper carried in stock.



#### Bridge Reamer Has Four Flutes for Free Cutting Action

Designated as the Type No. 344, a bridge reamer with four flutes designed to promote free cutting action with more chip space has been announced by Chicago-Latrobe, 419 W. Ontario St., Chicago 10, Ill. According to the manufacturer, the left-hand spiral prevents grabbing or hogging in with subsequent stalling or air tools.

Available in the full range of sizes from 13/32 through 11/2 in. diameter, the tool is provided with a pilot point to facilitate entry in small or irre-



Chicago-Latrobe Type No. 344 Bridge Reamer

gular holes. The reamer is said to be ideal for use in enlarging and aligning holes in structural members, such as I-beams, channels and plates.

#### YOU CAN RELY ON CONANT BROACHING TOOLS and BROACHING FIXTURES

Conant offers complete engineering and manufacturing facilities for your broaching needs. Expertly designed for proper strength and chip carrying capacity. Prompt broach sharpening and reconditioning service. Order standard keyway broaches from our stock.

Your inquiry invited. Send us part prints for recommendation and quotation.

# 347 W. 107th St., Chicago 28, III.

#### Gear Shaper Has Capacity of 6-Inch Pitch Diameter and 2-Inch Face Width

Identified as the No. 4GS, a gear shaper which has a capacity of 6 in. pitch diameter and 2 in. face width for external and internal spur and helical gears has been introduced by The Fellows Gear Shaper Co., 78 River St., Springfield, Vt. The maximum diametral pitch is 5/7 for spur gears and 6 for helical gears. The machine utilizes a 4-in, pitch diameter cutter mounted on a 3%-in. diameter cutter spindle which is reciprocated through a 21/2-in. rock-shaft driven from a crankshaft. The drive to the crankshaft from the main drive shaft is through a pair of pick-off gears which can be changed to give cutter spindle speeds ranging from 98 to 635 strokes per minute. The main drive shaft is



# FULLER'S EARTH

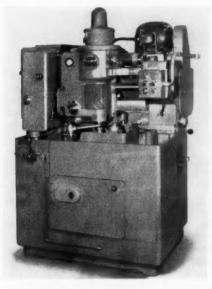
Adds greatly to the safety of your shop • Provides safe non-slip footing • Absorbs oil and grease • Lessens fire hazard because, unlike saw dust or wood shavings, it is non-inflammable . Every shop needs this low cost safety aid.

A trial will convince you. Send for FREE SAMPLE.

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driven by a 1½-h.p., 1,200-r.p.m. motor through a Gilmer belt.

The rotary feed of cutter and work is also governed by pick-off gears, providing feeds ranging from 0.008 to 0.024 in. per stroke of a 4-in. pitch diameter cutter. The relation between the number of teeth in the work and the number of teeth in the cutter is maintained by compound change gears. Other features of the machine

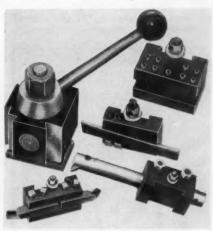


Fellows No. 4GS Gear Shaper

include a depth feed mechanism, air operated saddle return, cam trip mechanism to automatically accelerate the withdrawal of the cutter from the work when the last tooth has been cut, separate coolant pump and motor operated by switch button, forced feed lubrication for all main operating parts and a hand operated mechanism for rapid rotation of the work spindle to true work or fixtures. The machine is said to be particularly adapted to arrangement for automatic loading and unloading.

# ALORIS "Quick Change" TOOL POST

AND TOOL HOLDERS for all lathe operations



5 Models—for all lathes up to 36"

- · EASILY INSTALLED
- CUTS SET-UP TIME 90%
- ADJUSTING SCREWS ELIMINATE SHIMS
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- RUGGED CONSTRUCTION
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Tool Post and Holders priced from \$76.50 set: Write for catalog and price list.

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ALORIS TOOL CO., INC.

131-37 SANFORD AVENUE
FLUSHING 55, N. Y.

#### Drill Is Designed for Use with Flexible Drive Shafts

A drill which is designed for use with flexible drive shafts or extension arms for drilling holes in narrow and inaccessible places, such as airframe fuselages, wing and tail surfaces and other complex sheet metal shapes, has been announced by National Twist Drill & Tool Co., Rochester, Mich. The drill combines an adapter and threaded shank drill into one unit, thus elim-



National Drill for flexible drive shafts

inating runout of the drill, difficulty in removing broken drill ends, and labor in assembling. The drill is short and is said to have unusual concentricity with the driving head with which it is used.

#### SOLD THRU LEADING SUPPLY HOUSES



GROBEI CENIERLESS COUNTERSINKS
Six staggered cutting edges give shearing
cut that eliminates all chatter.
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New York • Chicago • Detroit • Montreal

#### Machine Is Designed for Rapid Production of Spur and Helical Gears

Morey Machinery Co., Inc., 383 Lafayette St., New York 3, N. Y., has introduced the "Hydrax" Single-Spindle Gear Hobbing Machine which is designed for the rapid production of spur and helical gears by either "climb" or conventional hobbing. The machine has a fully automatic cutting cycle operated by a single push button.

Feeds are hydraulically controlled and steplessly variable, and rates up to ½ in. per revolution of the work are said to be obtainable without exceeding the limits of accuracy required for subsequent shaving operations. The work axis is inclined to the direction of the hob feed at the helix angle of the gear, and the hob slide is set at the worm angle of the hob. When cutting, the hob is traversed in



a vertical direction along the helical tooth. The minimum hob transverse is given by plunge feeding the hob to depth. Hobs up to 7 in. in diameter and 7 in. in width can be used, and the hob spindle runs at speeds ranging from 84 to 600 r.p.m. Proper safety interlocks are incorporated in the machine.

The machine is said to be capable of cutting spur gears up to 10 in. face

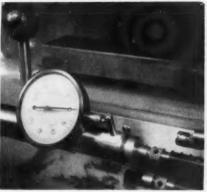


"Hydrax" Single-Spindle Gear Hobbing Machine

width and 14 in. in diameter with a 3-in. diameter hob, and gears up to 10 in. in diameter with a 7-in. diameter hob. Thirty-degree helical gears with a maximum face width of 3 in. and up to 14 in. in diameter can be cut with a 3-in. diameter hob, and up to 10 in. in diameter hob, and up to 10 in. in diameter and 9-in. face width with a 7-in. hob. The machine takes hobs from 2½ to 7 in. in diameter. The maximum pitch is 3 D.P. Plunge and vertical feeds from ¼s to 5 in. per minute can be obtained with the machine.

## POSITIVE Stop Attachment

for any turret lathe having multiple stop roll



Pat. Pending

 Particularly suitable to W & S, J & L and Gisholts. Be sure to specify make and model. Guaranteed to hold to .001 on any lateral dimension from face off to steps, grooves, etc. Eliminate human element of feel.

Saves time on set-ups and between shifts. Exceptionally accurate and fast on re-work. Chrome plated and case hardened for longer life.

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Write for Literature

Dealer Inquiries Invited

One Thousandth Stop Co.

VAN NUYS,

CALIFORNIA

## new literature

- 1. Clamps, Chisels, Punches, Masonry Drills, Circle Cutters, File Cleaners and Saw Vises in the Hargrave "Load Tested" line are described in a catalog (No. 65) published by The Cincinnati Tool Co., 1947 Waverly Ave., Cincinnati 12, Ohio.
- 2. Rockwell Hardness Testers. A catalog providing englineering data, uses and design features of the complete line of Rockwell hardness testers has been prepared by Wilson Mechanical Instrument Division, American Chain & Cable Co., 230-G Park Ave., New York 17, N. Y.
- 3. Compression Fixture and Setting Gage and Micrometer Grinding Fixture are described in a bulletin released by Scully-Jones and Co., 1909 S. Rockwell St., Chicago 8, Illinois.
- 4. Grinding Coolant, designated as "Triple C," is described in a catalog issued by The Motch & Merryweather Machinery Co., Cutting Tool Division, 1250 E. 222nd St., Cleveland 17, Ohio.
- 5. Rubber and Leather Packings. Vix-Syn Synthetic Rubber Packings and VIM Leather Packings are described in literature compiled by E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pennsylvania.
- 6. Hand Broaching Machine, designated as the Model VH-215, is described in a folder released by Pioneer Broach Co., 6434 E. Telegraph Rd., Los Angeles 22. California.
- 7. Chuck Control and Holding Power Regulator, identified as the "Neutrolator," is described in a bulletin (No. NL33) issued by Electro-Matic Products Co., 2235-37 N. Knox Ave., Chicago 39, Illinois.

- 8. Tool Control Unit which automatically shuts down the machine when tools need changing is described in a folder issued by The Cross Co., Detroit 7, Michigan.
- 9. Wheel Forming Attachment, designated as the "Diaform" Series R, for cutter relief angle compensation is described in a bulletin published by Pratt & Whitney, Division Niles-Bement-Pond Co., 25 Charter Oak Blvd., West Hartford 1, Connecticut.
- 10. Automatic Drilling Units for fast small hole drilling are described in a catalog released by The Electro-Mechano Co., 265 E. Erie St., Milwaukee 2, Wis.
- 11. Duplex Vertical Hydro-Broach Machines which may be tooled up with hand clamping or automatic fixtures to surface broach a variety of parts is described in a catalog (No. M-1848) published by The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.
- 12. Rubber-Bonded Centerless Grinding Wheels are described in a bulletin (No. 6925) issued by Manhattan Rubber Division, Raybestos-Manhattan, Inc., Passaic, New Jersey.
- 13. Tapping Attachments. Tapmatic Corp., Costa Mesa, Calif., has published a bulletin describing the "Tapmatic" attachment for non-reversible spindles and the "Tapmaster" attachment for reversible spindle machines.
- 14. Turret Drilling Machine which is capable of performing up to six different drilling and tapping operations at a single station is described in a bulletin (No. 5403) compiled by Howe & Fant, Inc., 31 Fitch St., East Norwalk, Connecticut.

- 15. Combination Hydraulic Forcing and Straightening Press featuring quick-change tables is described in a specifications manual released by Stanley H. Holmes Co., 3300 W. Lake St., Chicago 24, Illinois.
- 16. Hydraulic Press. The Denison Engineering Co., Columbus, Ohio, has issued a catalog (No. 153) illustrating how to cut costs and boost production by use of the Multipress for blanking, forming, drawing, riveting, crimping and other operations.
- 17. Precision Cylindrical Grinders, including universal, plain, roll, centerless and special purpose types, are described in a general catalog published by Landis Tool Co., Waynesboro, Pennsylvania.
- 18. How to Sharpen Curved Tooth Milling Cutters is explained in a bulletin issued by Aber Engineering Works, Inc., Waterford, Wis. Tables showing distance to set center of wheel above the cutter center and distance to set tooth rest below cutter center are included.
- 19. Rotary Handle Action "Pancake" Valve which has poppet-type seals is described and illustrated in a bulletin (No. 307) released by Ross Operating Valve Co., 120 E. Golden Gate Ave., Detroit 3, Michigan.
- 20. Quick-Change Adjustable Multiple Drill Head which is entirely gear driven and which is available with from two to eight spindles is described in literature published by Wisconsin Drill Head Co., Butler, Wisconsin.

- 21. Underdrive Power Squaring Shears are fully described and illustrated in a bulletin (No. 69D) published by Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, N. Y. Specifications are included in the bulletin.
- 22. Combination Dial Feed Table and Indexing Fixture with a positive lock feature is described and illustrated in a catalog (No. T-725) issued by The A. K. Allen Co., 57 Meserole Ave., Brooklyn 22, N. Y. Dimensional drawings are included.
- 23. Adjustable Adapters. Economy Tool & Machine Co., 1827 S. 68th St., Milwaukee 14, Wis., has released a specification catalog covering its "Tru-Loc" Adjustable Adapters. Line drawings are included.
- 24. "Hack Saws and How to Use Them" is the title of a booklet published by Simonds Abrasive Co., Philadelphia 37, Pa. The booklet covers both hand and power hack saw blades.
- 25. "Chips Tell the Story," a booklet (No. C-54) issued by Colonial Broach Co., P.O. Box 37, Harper Station, Detroit 13, Mich., tells in a simple manner just "why" and "how" broaching and broaching equipment are capable of producing parts so accurate and at such high rates of speed.
- 26. Geared Head Lathe. Sheldon Machine Co., Inc., 4250 N. Knox Ave., Chicago 41, Ill., has issued a bulletin (No. SA 254) describing and illustrating the Sebastian 16-Inch Geared Head Lathe which is sturdy and accurate.

# TEAR OFF AND ALL THIS CARD TODAY OR FREE LITERATURE

| MODERN MACHINE SI | IOP September, 195 |
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- 27. Centrifugal Coolant Pumps, vertical and horizontal models, for a wide variety of industrial purposes are described and illustrated in a catalog issued by The Fulflo Specialties Co., Inc., Blanchester, Ohio.
- 28. Stress Rupture Data on 11 Tubing Steels used in high temperature service are shown on a data card (No. TDC 153-A) released by Tubular Products Division, The Babcock & Wilcox Co., Beaver Falls, Pennsylvania.
- 29. Sheet Metal Brakes and Cleat Benders are fully described and illustrated in literature issued by R. E. Smith, 1122-30 Elizabeth, P.O. Box 78, Waukegan, Illinois.
- 30. Coated Abrasives and Oilstone Files. Behr-Manning Corp., Division of Norton Co., Dept. MS, Troy, N. Y., has issued a catalog on its coated abrasives, including bands and discs, as well as India and Hard Arkansas oilstone files.
- 31. Live Centers which have a low overhang and a slight cushioning action that compensates for expansion due to heat, shock and excessive thrust loads are described in a bulletin (No. 654) published by Sturdimatic Tool Co., 3904 F St., Detroit 16, Michigan.
- 32. Circular Metal Cutting Tools. Circular Tool Co., Inc., Providence 5, R. I., has published a catalog (No. N) which describes 20 different standard types of circular metal cutting tools. A cutting speed conversion table and recommendations of most efficient speeds and feeds are included.

- 33. Speed Indexers for milling, drilling, tapping, spot welding or any other assembly operation where regular spacing is required are described in a folder published by Erickson Tool Co., 2304-A Ham, itton Ave., Cleveland 14, Ohio.
- 34. Diamond Wheels, designated as Asco Superbond, which are resinoid and metal bonded are described and illustrated in a catalog released by Anton Smit & Co., Inc., 333 W. 52nd St., New York 19, N. Y. Complete specifications and line drawings are included.
- 35. Furnaces, Burners, Valves, Torches, Mixers, Blowers, Stock Tank Heaters and Controls are described and illustrated in a catalog (No. 55) issued by Johnson Gas Appliance Co., 571 E Ave., N.W., Cedar Rapids, Iowa. Specifications are included.
- 36. Honing Machines. Sunnen Products Co., 7910 Manchester, St. Louis 17, Mo., has published a catalog showing typical applications of Sunnen Honing Machines in production, toolroom, maintenance and salvage operations.
- 37. Straight-Side Single Crank Presses, designated as S-1 Models, with capacities ranging from 50 to 400 tons are described and illustrated in a catalog (No. 9-D) published by E. W. Bliss Co., Canton, Ohio.
- 38. Milling, Profiling, Die Sinking and Engraving Machines are described and illustrated in a catalog issued by George Gorton Machine Co., 1707 Racine St., Racine, Wis. Complete specifications are included.

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- 39. Machine Mobility. A bulletin (No. R541) describing benefits that industrial plants can derive through mobility of machines is available from Barry Corp., 784 Pleasant St., Watertown 72, Mass.
- 40. Turret Tool Posts, Hex Turrets and Tailstock Turrets are described in a catalog (No. 53) published by Enco Mfg. Co., 4520-26 W. Fullerton Ave., Chicago 39, Illinois.
- 41. Engine-Driven Welders, designated as "Shield-Arc," which provide both the right type arc and right arc intensity are described in a bulletin (No. 1337) released by The Lincoln Electric Co., Dept. 3503, Cleveland 17, Ohio.
- 42. Die Heads. The Eastern Machine Screw Corp., 40-50 Barclay St., New Haven 6, Conn., has issued a bulletin (No. 17) describing H&G Insert Chaser Die Heads.
- 43. Industrial Work Bench Top, identified as the "ShopTop," which is Resinwood surfaced is described in a catalog published by Rock Island Millwork Co., Resinwood Division, Rock Island 6, Ill.
- 44. Extra Heavy-Duty Knife and Face Grinders, designated as the Series 220, are described in a bulletin issued by Samuel C. Rogers & Co., 183-205 Dutton Ave., Buffalo 11, New York.
- 45. Countersinks. M. A. Ford Mfg. Co., Inc., Davenport 13, Iowa, has released a bulletin (No. HSS 408) describing the Uniflute Countersink.
- 46. Hydraulic Tracer Attachment, designated as the "Trace-O-Matic," for heavy-duty lathes is described in a bulletin prepared by Axelson Mfg. Co. Division, Pressed Steel Car Co., Inc., 6160 S. Boyle Ave., Los Angeles 58, Calif.
- 47. Tube Cutter. The Steel Products Engineering Co., Brehm Die Division, 1205 W. Columbia St., Springfield, Ohio, has published a bulletin describing the Brehm Tube Cutter.
- 48. Universal Test Indicator, identified as the "Spot-On," is described in a bulletin issued by De Witt Equipment Corp., 136 Lafayette St., New York 13, New York.
- 49. Dust Collectors in cabinet cloth filter and cyclone separator types are described in a catalog prepared by Torit Mfg. Co., 296 Walnut St., St. Paul 2, Minnesota.

- 50. Basic Jig Systems for drilling, reaming, tapping and similar operations are described in a catalog released by Norco Basic Jig Systems, 39 Covington Rd., Buffalo 16, New York. Specifications are included.
- 51. Wrench Holder. The Micro Tool Co., 10 Sigourney St., Hartford 5, Conn., has issued a circular describing the Brooks Wrench Holder for socket head screw wrenches.
- 52. Tapers and Specifications Chart to assist grinding machine operators in the selection of correct centers for specific grinding machines has been released by Ready Tool Co., 540 Iranistan Ave., Bridgeport 5, Connecticut.
- 53. Single Spindle Automatic Screw Machine, identified as the "Double-Matic," is described in a bulletin released by Porter-McLeod Machine Tool Co., Inc., Hatfield, Massachusetts.
- 54. Bending Brakes. O'Neil-Irwin Mfg. Co., 306 8th Ave., Lake City, Minn., has issued a hand guide to aid in selecting and operating Di-Acro Bending Brakes. Specifications are included.
- 55. Hydraulic Components are described in a condensed catalog (No. 1101) published by The Hydraulic Press Mfg. Co., Mount Gilead, Ohio.
- 56. Gear Shapers. Michigan Tool Co., 7175 E. McNichols Rd., Detroit 12, Mich., has issued a bulletin (No. 1800-54) describing the "Shear-Speed" process for cutting gears, splines, cams, sprockets and miscellaneous external shapes.
- 57. Free Machining Steel. Peter A. Frasse & Co., Inc., 17 Grand St., New York 13, N. Y., has published a catalog describing Ledloy-A, a free machining, lead bearing steel.
- 58. Aluminum. A booklet describing the work of Aluminum Research Laboratories has been prepared by Aluminum Company of America, 726 Alcoa Bldg., Pittsburgh 19, Pennsylvania.
- 59. Wet Grinding Attachment. Magic City Machine Tool Co., 817 E. Charles St., Muncie, Ind., has issued a catalog describing the principle of damp, refrigerate grinding.
- 60. Precision Screw Machine Products are described in a brochure prepared by Precision Products Division, The New Britain Machine Co., New Britain, Conn.

## metalworking news in brief

Metallizing Engineering Company, Inc., has moved its eastern offices, factory and warehouse from 38-14 30th St., Long Island City, N. Y., to 1101 Prospect Ave., Westbury, Long Island, New York.

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Ready Tool Co., Bridgeport, Conn., has announced the appointment of the following manufacturers' representatives: Roger W. King, 191 Swain Ave., Meriden, Conn.; B. S. Meade Co., 604 Duquesne Terrace, Union City, N. J.; and Herren & Sims Co., 1601 St. Clair Ave., Cleveland, Ohio.

Firth Sterling Inc., Pittsburgh, Pa., has announced the appointment of James L. Zimmerman, W. R. Sutton, J. F. Kroeger and J. J. Journeycake as carbide service engineers in the Chicago, Detroit, Los Angeles and Houston districts respectively.

Robert W. Peterman, formerly responsible for both product design and sales engineering, has been appointed sales manager of the Nopak Division, Galland-Henning Mfg. Co., Milwaukee, Wis. In his new capacity, Mr. Peterman will handle all matters relating to general sales supervision and sales engineering in connection with the application of Nopak air and hydraulic valves, cylinders and accessories. Robert J. Garnik has been appointed chief engineer, responsible for new product design and development.

Gisholt Machine Co., Madison, Wis., has announced the retirement of George E. Gernon, secretary, as a member of the board of directors. Mr. Gernon recently completed 54 years of service with the company and has been secretary of the firm for the past 49 years. He will continue in the capacity of secretary. The company has also announced the election of Howell W. Murray to the board of directors.

Maurice S. Dessau is celebrating his 51st year of being in the industrial diamond business and is currently serving in the capacity of supervising the activities of Maurice S. Dessau Co., Inc., New York, New York.

Wesson Co., Detroit, Mich., has announced the appointment of Paul H. Miller, research engineer, to the position of assistant to the vice president in charge of research and development. In his new position, Mr. Miller will assist in the creation of tools and products for new metalworking applications.

The Bellows Co., Akron, Ohio, has announced the establishment of a new sales office at 330 Municipal Court Bldg., Ann Arbor, Mich., to better serve industrial customers in that area. Daniel J. Gurta, formerly a design engineer with automotive manufacturers, has been appointed the field engineer in charge of the new office.

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#### Metalworking News in Brief

The Morris Machine Tool Co., Cincinnati, Ohio, has announced the appointment of Carl W. Larrick as works manager. Mr. Larrick was formerly production control manager.

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The Carborundum Co., Niagara Falls, N. Y., has announced the appointment of I. Wendell Hamm as director of manufacturing. Mr. Hamm was formerly chief of industrial engineering for DuPont Company's Nylon Division. — o —

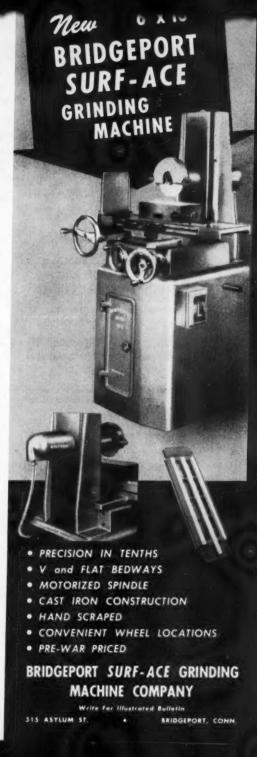
Walter E. Jones, metallurgical development engineer at the Thomson Laboratory of General Electric Co., Lynn, Mass., has been appointed manager of vacuum melted products engineering at Carboloy Department of General Electric Co., Detroit, Michigan.

— o —

The appointment of three western distributors to handle local area stocking and sales of "Shear-Speed" Soluble Oil has been announced by Shear-Speed Chemical Products, Division of Michigan Tool Co., Detroit, Mich. W. E. Ziegler, 3115 W. Third St., Los Angeles 4, and the L. P. Degen Belting Co., 260 Mission St., San Francisco, will cover southern and northern areas of California, respectively. The Chemical Sales Co., 1125 Seventh St., Denver, will handle sales in Colorado.

Automatic Methods Inc., Elizabeth, N. J., has announced the appointment of Detroit Tap & Tool Co., Baseline, Mich., as its exclusive distributor to handle sales and service of "Auto-Tap" Lead Screw Tapping Tools in Ohio, Indiana, Michigan, northern Illinois, Wisconsin, eastern Iowa and California. The B. C. MacDonald Company, with offices in St. Louis, Wichita and Kansas City, has been appointed exclusive sales representative in Missouri, southern Illinois, Kansas, Nebraska and western Iowa.

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#### Metalworking News in Brief

Babcock & Wilcox Co., New York, N. Y., has announced the appointment of Ralph K. Behr as manager of the Boston district office of its Boiler Division, replacing H. K. Dean who has retired after 31 years of service with the company. Mr. Dean was manager of the Boston office for the past 13 years. Mr. Behr was attached to B&W's Chicago district office.

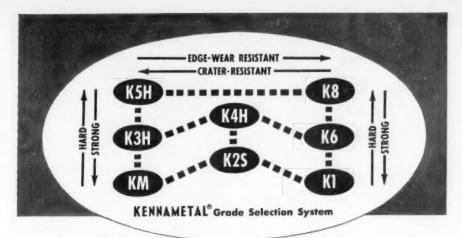
Peter J. Jensen has been named manager of manufacturing at Carboloy Department of General Electric Co., Detroit, Mich. John A. Muldoon succeeds Mr. Jensen as manager of the Michigan sales district.

\_ 0 -

Merit Products, Inc., Culver City, Calif., has announced the appointment of three sales representatives for its line of Sand-O-Flex contour sanders and Grind-O-Flex flexible grinding wheels. Norman Dahley, 329 S. Wood St., Chicago, will cover Illinois and Wisconsin; The Herren-Sims Co., 1601 St. Clair Ave., Cleveland, will handle Ohio and West Virginia; and W. J. Holtmeier Co., 71 W. 23rd St., New York City, will represent Grind-O-Flex in the state of New York.

National Tool Co., Cleveland, Ohio, has announced the election of Raymond D. Lindstrom as vice president of manufacturing and Joseph B. Clough as vice president of sales. Mr. Lindstrom was formerly factory manager and Mr. Clough was director of sales.

Allegheny-Ludlum Steel Corp., Pittsburgh, Pa., has announced the appointment of Marlin R. Hemphill as general manager in charge of its Carmet Division, Ferndale, Mich. Mr. Hemphill was formerly assistant plant manager of the corporation's Forging and Casting Division.



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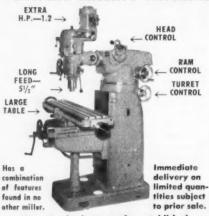
#### Metalworking News in Brief

Fuflo Specialties Co., Blanchester, Ohio, has announced the appointment of **Hayden & Co.**, 53 W. Jackson Blvd., Chicago, Ill., as its representative in the sections of Indiana, Illinois and Wisconsin covered by the Chicago area.

Farrel-Birmingham Co., Inc., Ansonia, Conn., has announced the election of **Donald A.** Comes as vice president. Associated with the company since 1922, Mr. Comes will also continue to hold his present position as general sales manager.

Henry W. Koester, service representative for Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., has been transferred from the home office to Los Angeles, California, which will be his headquarters for the servicing of G&L equipment on the west coast.

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Carl G. Flygare, grinding development engineer at Norton Co., Worcester, Mass., retired recently after 47 years with the company. Succeeding Mr. Flygare as head of the engineering department is Herbert A. Silven, a Norton machine designer since 1916.

The appointment of Sidney W. Steensma as export sales manager has been announced by Bausch & Lomb Optical Co., Rochester, N. Y. Steensma succeeds Gustave J. Husson who has retired after 43 years of service with the company.

Covel Mfg. Co., Benton Harbor, Mich., has announced the appointment of two dealer-representatives for the Covel and Excel lines of precision grinders. E. W. Smith Machinery Co., Columbus, Ohio, will cover the central Ohio territory, and Keen Machinery Co., Cincinnati, Ohio, will serve the Cincinnati-Dayton area.

-0-

J. S. Roller has been promoted from assistant general sales manager to general sales manager of Firth Sterling Inc., Pittsburgh, Pa. Mr. Roller joined the company in 1951 as vice president and general manager of The Method X Company, a Firth Sterling affiliate, after having served for 15 years in various capacities in the sales department of Republic Steel Corporation.

The Hallden Machine Co., Thomaston, Conn., has announced the appointment of John Upton, Jr., as general manager. Mr. Upton was formerly associated with The Wean Engineering Co., Inc., Warren, Ohio.

Ready Tool Co., Bridgeport, Conn., has announced the appointment of Littlejohn Co., 4511 Melrose Ave., Los Angeles, Calif., as its representative for southern California, Arizona and southern Nevada.

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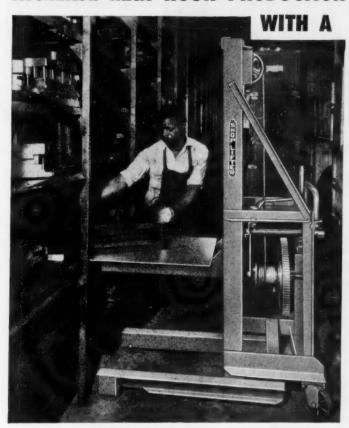
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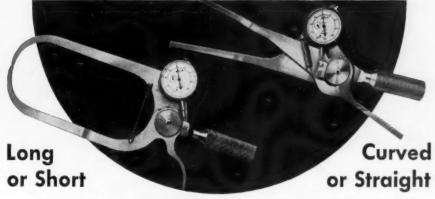
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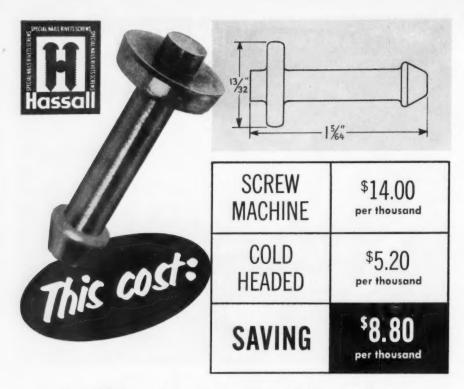


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Mr. Johnson said that it was open to question whether it is economically advisable to attempt to replace the many skills of the human operator by mechanisms. Beyond a certain point of automaticity, he warned, the objectives can be gained only at the expense of added complications which may not be worth the cost.

He added: "Development of the semiautomatic grinding machine, for example, has now been attained to meet a variety of requirements, but its completely successful operation still depends on the skill of the operator.

"As we move into the area of engineering of our cylindrical grinding machine to make it fully operative without the advantages of the human being, we struggle with detailed problems which give us the opportunity for humble recognition of ourselves as human beings. We sometimes reflect from our problems and think of how the Lord must be smiling at us to see what a mess we make of these en-

gineering problems when we ourselves are such a wonderfully perfectly engineered composition of matter, motion, power and control."

There must be some point, Mr. Johnson said, at which there is an economic advantage in stopping the design efforts directed toward the completely automatic machine. He observed, however, that each job has its own conditions and that there are cases in which it is economical to expend the efforts and costs which result in a machine which has built into it as much of man as is possible.

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September, 1954

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          - Operates by air or hydraulics



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